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the news digest magazine

Volume XXVI - No. 3 March, 1953

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VOLUME 8

REVIEW OF METAL LITERATURE

7728 abstracts; 884 pages; accompanied by subject index, author index, and publication index

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The yearly editions of the A.S.M. Review of Metal Literature are your reference key to all published information on metals and the metal industry. Volume 8 contains a complete survey of all the metallurgical literature published during the period January through December 1951.

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Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXVI, No. 3 March, 1953

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New Carolinas Chapter Premier Meeting

Reported by James J. Hairston

Engineer of Manufacturing
Tool Design Dept., Western Electric Co.

Approximately 40 metallurgists and engineers from various towns in North Carolina attended the first meeting of the new Carolinas Chapter of the American Society for Metals. A. R. Fairchild, chief metallurgical engineer of the North Carolina Works of Western Electric Co., presided. Robert N. Marshall, assistant superintendent of manufacturing engineering of Western Electric Co., and vice-president of the Southern Association of Science and Industry, the coffee speaker, gave a talk on "Technology Moves South". He called attention to the large number of industries which have moved South, and gave as one reason for this the mechanization of farms, which has liberated large numbers of workers to urban industries, and also favorable tax situations and legislation.

Mr. Marshall stated that technology was not moving South at the same high rate, however. He asked the membership of the Carolinas Chapter to join forces with other engineering societies and take steps to alleviate the South's need for technological and scientific education. He illustrated his talk with well-chosen slides, showing the recent rapid industrialization of the South.

Ernest E. Thum, editor of *Metal Progress,* addressed the meeting on the "Metallurgical Aspects of Atomic Energy". He prefaced his talk with some comments on the development of the American Society for Metals. He said that need for disseminating information about heat treatment of ordnance items in World War I caused the formation of two small groups of heat treating specialists in Chicago and Detroit which were the forerunners of the present A.S.M. (which now has a membership of 22,000). He said a chief object of the Society was to spread information in the metallurgical field.

Mr. Thum pointed out that the application of atomic energy to many peacetime activities, such as agriculture, power generation, and medical science, must await new developments in the field of metallurgy. He stated that before power plant turbines can be expected to operate with any degree of efficiency by atomic power, metals must be developed to remove the heat from the reactor satisfactorily without quenching the chain reaction. He described the various uses medical science has already found for the radioactive products, especially in diagnosing diseases of the circulatory system. It has its greatest potential uses as specifics for treatment of deep-seated cancers.

Mr. Fairchild presided over a short business session. Al Cooper of Charlotte gave a financial report. Moss Davis of Winston-Salem gave a membership report which showed that the new chapter has 57 members, four of them sustaining. Howard F. Blackwood, Jr., secretary, said that the Chapter's Charter has been granted by an unanimous vote of the national trustees. A nominating committee composed of Michael Milo, William Cason, and James Hairston was elected to present the Chapter's first slate of officers.

A copy of the proposed constitution was given the members for consideration. Temporary officers are Albert R. Fairchild, chairman; A. B. Cooper, treasurer; J. R. Huntley, vice-chairman; H. F. Blackwood, Jr., secretary; M. V. Davis, membership; and Michael Milo, fellowship.

At the Premier Meeting of the Recently Organized Carolinas Chapter in January Were the Officers Selected for the Current Term. Seated. from left, are: Jack Austin, fellowship commutee; Jim Huntley, vice-chairman; Dick Tilman, director; Al Fairchild, chairman; Howard Blackwood, secretary; and Mike Milo, fellowship committee. Standing, from left, are: Paul Williams, fellowship committee; Moss Davis, membership committee; and Paul Moody, Ed Talone, Bill Casen and Jim Hairston, directors. Al Cooper, treasurer, and Bill Brinkley, director, were not present when the photograph was taken

Explains Electron Metallography

Young Fellows' Night During the January Meeting of the Chicago Chapter Featured Thomas A. McLauchlan, Research Technologist, U. S. Steel Corp., Who Spoke on "Electron Metallography of Steel". Shown are, from left: Otto Zmeskal, Illinois Institute of Technology, vice-chairman; James K. Stanley, Standard Oil Co. of Indiana, technical chairman; E. Roff, U. S. Steel Corp., chairman; Dr. McLauchlan; and James Lommel, president of the student group of junior members at the Illinois Institute of Technology

Reported by Paul Gordon
Institute for the Study of Metals
University of Chicago

Contrary to general opinion, it is easier to obtain consistently good pictures with the electron microscope than high magnification photomicrographs with the light microscope. This was the opinion of Thomas A. McLauchlan, research technologist, U. S. Steel Corp., who gave a talk on "Electron Metallography of Steel" at the January meeting of the Chicago Chapter. This meeting was designated as Young Fellows' Night and a large group of junior members and students as well as regular members was present.

Dr. McLauchlan stated that although maintenance of the electron microscope and specimen preparation are somewhat more difficult than for the light microscope, once these are under control, the 100-fold greater resolving power of the electron microscope makes it a very important tool for the metallurgist.

The electron microscope is capable of revealing microconstituents as small as 10 to 20 Å in size (5 to 10 atom diameters). However, with the present techniques for etching metal specimens and for preparing surface replicas for electron microscopic examination, the lower limit on the size of observable microconstituents in metals is 50 to 100 Å.

The electron microscope, in conjunction with X-ray and electrone diffraction for positive identification of phases, is of great utility in the study of such problems as the structure of bainite and tempered martensite, the reason for temper brittleness, the effect of boron on hardenability, the details of spheroidization and graphitization, the improvement of hardness and toughness of steels, and phase relations in corrosion and heat resisting steels.

The optical system of the electron microscope is quite analogous to that of the light microscope, with electromagnetic "lenses" replacing the familiar glass lenses. In addition to its greater absolute resolving power, the electron microscope has the further advantages that its resolving power is at its maximum for all magnifications, it has great depth of focus, and the specimen-to-microscope distance can be quite large, allowing greater working facility.

The main complexity of the apparatus is its involved electrical circuits, but several compact commercial models put on the market by RCA, Philips, and others minimize this difficulty.

Specimen preparation involves careful grinding and polishing to avoid distortion of the sample surface, followed by light etching and thorough washing. The specimen is not photographed directly, since it is opaque to the electrons. Instead, a thin plastic replica of the surface is made.

Dr. McLauchlan showed many beautiful electron micrographs of pearlite, bainite, and martensite. One result of his investigations is the possible need for a new name for either upper or lower bainite, since, he stated, his pictures show a distinct difference between the structure of the two constituents.

Roberts Talks on Toolsteels in Buffalo

Reported by A. E. Leach
Metallurgist, Bell Aircraft Co.

National Officers' and Past Chairmen's Night was held by the Buffalo Chapter in November. George A. Roberts, A. S. M. trustee and chief metallurgist of the Vanadium-Alloys Steel Co., gave a report on activities at national headquarters, and delivered a talk on "Toolsteels".

Although the grades of toolsteel number in the hundreds, Dr. Roberts said that 12 grades account for 95% of the usage in this country.

Double tempering operations are usually necessary in heat treating toolsteels in order to develop maximum toughness. The first temper produces tempered martensite and transforms retained austenite to untempered martensite. The second temper produces a homogeneous structure of tempered martensite.

Adding vanadium to toolsteels improves their hot hardness because the vanadium carbide particles are much harder than other metallic carbides. This, of course, enhances the usefulness of high speed toolsteels, giving them superior wear resistance and cutting properties.

Data were presented to show how tempering temperature affects the transformation of retained austenite. High speed toolsteels can be used at a very high hardness because the retained austenite transforms to martensite at high draw temperatures but the hardness does not drop. The retained austenite in other types of toolsteels which soften more rapidly than high-alloy types will transform when low draw temperatures are employed leaving a tempered martensite structure of lower hardness level.

Dry Cyaniding Process Explained

Reported by R. C. Pocock
Chief Engineer, Eng. Research Lab
Bendix Products Div.

At the January meeting of the Notre Dame Chapter, F. D. Widner of the Surface Combustion Corp., gave a talk on "The Practical Aspects of Dry Cyaniding".

He prefaced his talk with a history of this method of surface hardening of steels as compared to the conventional carburizing treatments.

In general, dry cyaniding consists of heating steel in an atmosphere of hydrocarbon gas, ammonia and a carrier gas, and then either furnace cooling or quenching the work. With this metod of heat treatment silver brazing can be done at the same time as the dry cyaniding.

With low heat treating temperatures, high ammonia content is used, while with high heat treating temperatures it is standard practice to use low ammonia content in the atmosphere.

Mr. Widner listed the different applications on which this type of hardening is being used. He showed slides of various furnace drawings and their plant installations, pointing out the merits of each furnace.

The speaker also described the design and operation of the endothermic-type RX generator which is commonly used for supplying the carrier gas for the process.

Summer Job List Available to Students

Hundreds of summer job opportunities for engineering students will be listed in the A.S.M. summer employment program now getting under way. This is a cooperative effort whereby university students seeking summer employment are placed in touch with companies that have openings in their engineering, laboratory and production departments during the summer season of 1953.

Leading firms in the metalworking industry are now being asked to report on their needs for student employees during the summer of 1953. It is expected that the current A.S.M. summer employment program will list a greater number of student opportunities than did the program carried out during the summer of 1952, when a total of 1858 openings were listed.

Again this year A.S.M. will secure information from companies seeking summer help in their engineering and technical activities, and will pass the information on to universities and colleges and other groups in the form of a printed list. Engineering students will have an opportunity to see the list of job opportunities and to choose the type of work which interests them most. They will also be able to make their choice of a company and locations. Students will have ample time to make their job selections well in advance of summer vacations.

While the summer employment service is primarily designed to assist engineering students who are members of the American Society for Metals, all engineering students are urged to make use of the service to further their education and on-the-job training. There is no charge to either the student or the employer for this service.

A.S.M. chapters desiring to co-operate in this effort may secure blank printed forms for mailing to local industries in their areas. These printed forms are available from national headquarters in Cleveland.

Wilson at Minnesota

Reported by Arnold Bowers
Metallurgical Department
Minneapolis-Moline Co.

The January meeting of the Minnesota Chapter A.S.M. featured Ralph L. Wilson, president of the Society, and director of metallurgy at Timken Roller Bearing Co. Mr. Wilson spoke on "Current Developments in Alloy Constructional Steels", a talk he is delivering before many of the chapters this season. He also outlined the activities of the Society for the coming year.

Talks on Tool and Die Heat Treatment

Edward J. Pavesic, Director of Research, Lindberg Steel Treating Co., Spoke on the "Practical Aspects of Tool and Die Heat Treatment" Before the Texas Chapter in November. At the speaker's table were, from left: W. A. Hammer, executive committee; Mr. Pavesic; Arthur R. Oakley, Jr., secretary-treasurer; and W. Mack Crook, vice-chairman of the Chapter. (Photo by Lee Dolan)

Reported by Joe B. Marx
Sheffield Steel Corp.

Edward J. Pavesic, director of research, Lindberg Steel Treating Co., presented a talk on "Practical Aspects of Tool and Die Heat Treatment", at the November meeting of the Texas Chapter.

Mr. Pavesic's talk covered first some of the factors to consider when heat treating toolsteels. One point stressed was that the designer and the heat treater should have a good basic knowledge of metallurgy.

The greatest problem in the heat treatment of toolsteels is cracking, either during or after the heat treat cycle. Mr. Pavesic outlined the many causes for these failures, such as bad surface, improper heat treatment, and poor design. Also, even though toolsteel chemistry is not as closely controlled as that of the constructional alloy steels, the proper grade should be used for each job.

Mr. Pavesic felt rather strongly about the improper use of the word distortion. He stated that distortion is not dimensional change, and that some individuals confuse distortion with growth and shrinkage.

In the second part of the lecture a number of slides were shown, illustrating defects that occur in heat treated toolsteels—their causes and remedies; the right and wrong way to design dies; dimensional changes in a group of rings that were quenched and tempered by martempering, oil quenching and brine quenching methods, and the proper type of furnaces and equipment to insure good heat treatment.

Making Structural Parts From Metal Powders

Reported by Lacy M. Smith
Eastman Kodak Co.

"The Making of Structural Parts From Metal Powders" was discussed at the November meeting of the Rochester Chapter by Carl G. Johnson, vice-president in charge of engineering, Presmet Corp.

The manufacture of parts (sinterings) from powder metals has resulted in large savings on many small, intricate parts requiring tolerances of ±0.002 in. With iron-base alloys, mechanical properties obtainable range from 20,000 psi. tensile strength with 2 to 4% elongation, up to 100,000 psi. with little or no ductility. Depending on the composition of the powders used, parts made therefrom can be carburized, through-hardened, welded or plated.

The four basic requirements of a part to be made by powder metallurgy are design, economics, tolerances, and mechanical properties. When these factors are favorable, short runs of even 500 parts per tooling setup have proved economical. Numerous parts that have been made successfully in competition with the older methods of casting, forging and machining were displayed.

According to the speaker, applications for powder metallurgy are steadily increasing, and in the near future the present tonnage of iron powder used in this country (around 15,000 tons annually), may expand 10 to 100 times this figure.

DuPont Expands

The titanium sponge producing facilities of E. I. duPont de Nemours and Co. Inc. are how being expanded at the company's Newport, Del., plant, and expansion is scheduled to begin soon at the Edge Moor, Del., plant. This expansion will yield an estimated 13,500 additional tons of titanium sponge in the next five years.

Modern Cast Irons Topic of Northwest Circuit Talk

Reported by H. T. Southworth
Boeing Airplane Co.

Albert G. Zima, Head of the West Coast Technical Section of the International Nickel Co., Los Angeles, discussed "Modern Cast Irons" before the November meeting of the Puget Sound Chapter. Mr. Zima, the third Northwest Circuit speaker, presented the same talk before the Inland Empire, Columbia Basin, Oregon, British Columbia and Utah chapters during November.

Mr. Zima pointed out the impressive development made in cast irons over the past 30 years. This period has seen the evolution of a large family of cast irons from a relatively weak material which could only be specified as coarse or fine-grained cast iron, and was often employed only as a space filler. In this time the strength of unalloyed cast iron has been doubled and many special

A. G. Zima

purpose irons have been developed with exceptional properties for applications such as heat or corrosion resistance.

Mr. Zima's definition of cast iron "steel in which graphite is dispersed throughout its mass", gives a hint as to the vast number of alloys that may be considered under the classification of cast iron.

Mr. Zima discussed at length the role of graphite as effecting the characteristics of cast iron and how the properties may be influenced by control of the form and distribution of the graphite. Such control may be obtained by various inoculants introduced into the superheated melt, control of cooling rates, and by use of alloying elements.

He pointed out the many advantages of cast iron and illustrated these by calling attention to several applications, such as engine blocks, where it has been uniquely successful for many years.

Jewelry Designer Speaks at Purdue

Isabelle Joyce, Designer, Joyce, Inc., Explains How One of Her Jewelry Designs is Developed Before the Family Night Meeting of the Purdue Chapter in October. Miss Joyce discussed "Jewelry—Design and Manufacture" and explained how gems, metals and alloys are blended into the jewelry of modern design and lasting quality. (Photo by J. M. Hoegfeldt)

Koebel Gives Talk on Controlled Atmospheres

Reported by Clyde O. Penney
Metallurgist
Denver & Rio Grande Western RR

N. K. Koebel, director of research, Lindberg Engineering Co., presented an excellant talk before the Rocky Mountain Chapter in January on "Industrial Controlled Atmospheres".

Mr. Koebel traced the history of controlled atmospheres for heat treating from the early days of the coke-fired blacksmith furnaces down through the modern controlled atmosphere furnaces. Several curves were presented showing equilibrium relationships between steels, both carbon and alloy, and the dew point of the Hyen endothermic furnace atmosphere, together with slides illustrating various designs of heat treating furnaces for utilization of the Hyen endothermic atmosphere to its utmost efficiency. Slides were presented showing the latest type angle furnaces with preheat zone and high-temperature chamber at right angles to each other. This offers a marked advantage in that parts to be heat treated can be charged cold and removed cold after heat treating, without leaving the controlled atmosphere or having air come in contact with them at any time during the complete cycle.

Mr. Koebel devoted considerable time to a thorough explanation and discussion, including slides, of the carbonitriding process using the Hyen endothermic furnace atmosphere enriched with ammonia and natural gas. This very versatile furnace and atmosphere combination can be utilized for carburizing, straight hardening, or carbonitriding. Processes and furnaces for nitriding of steels were also described, particulary with reference to elimination of the troublesome "white layer" in steel, utilizing a two-stage cycle to reduce nitriding time.

Mr. Koebel also described a furnace and process for heat treating and bright annealing of stainless steel, using a dissociated ammonia atmosphere consisting of 75% hydrogen and 25% nitrogen.

IMPORTANT MEETINGS *for April*

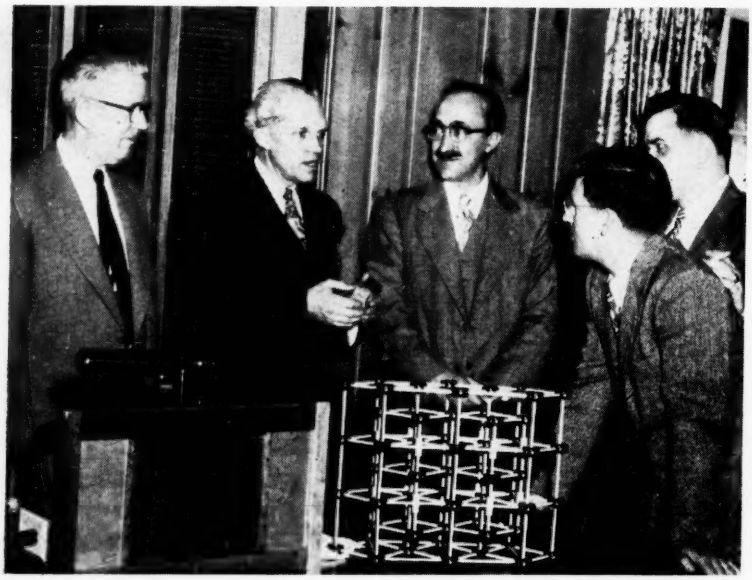
Apr. 12-16—Electrochemical Society, Inc. Annual Spring Meeting. Statler Hotel, New York City. (H. B. Linford, Secretary, E.S., 235 West 102nd St., New York 25, N. Y.)

Apr. 20-22 — American Institute of Mining and Metallurgical Engineers. 36th National Openhearth and Blast Furnace, Coke Oven and Raw Materials Conference. Hotel Kirkendall, Secretary A.I.M.E., 29 Statler, Buffalo, N. Y. (Ernest West 39th St., New York 18, N. Y.)

Apr. 23-24—American Mathematical Society (jointly with the Office of Ordnance Research). Symposium in Applied Mathematics. New York University, New York, N. Y. (Leon W. Cohen, Associate Secretary, A.M.S., 80 Waterman St., Providence 6, R. I.)

Apr. 27-28—American Zinc Institute. 35th Annual Meeting. Hotel Statler, St. Louis, Mo. (Ernest V. Gent, Secretary, A.Z.I., 60 East 42nd St., New York 17, N. Y.)

Morrill Gives Magnetic Materials Talk



Weston Morrill (Second From Left), Guest Speaker at the January Meeting of the Rochester Chapter, Discusses His Talk "Magnetic Materials" With Chairman R. J. Barr (Left), and Members E. Basilio, R. Barrow and M. Craft

Reported by Lacy M. Smith
Eastman Kodak Co.

Weston Morrill, supervisor of metals for the Transformer and Allied Products Division, General Electric Co., discussed "Magnetic Materials" at the January meeting of the Rochester Chapter. Mr. Morrill is well known for the role he played in the development of crystal-oriented silicon steel with its excellent magnetic properties.

Historically, magnetic materials were in use as far back as 9 B.C. when the Greeks used lodestone for compasses. As an art the use of magnetic materials is ancient and only during the past 75 years has science come to the fore with the development of magnetically soft materials.

The properties of modern magnetic materials have made it possible for the design engineer to reduce substantially the weight of comparable transformers during the past few years, in some instances as much as 50%. Even with the present state of development it is estimated that world production of copper will not be sufficient for the electrical requirements of our country unless further significant progress is made in developing better magnetic materials.

The theory of magnetism and the properties obtainable in commercially available magnetic materials were presented by the speaker. He showed slides to illustrate the change in properties due to crystal orientation, secondary grain growth and domain structure.

Trends in Aluminum Casting Applications Outlined in Buffalo

Reported by A. E. Leach
Metallurgist, Bell Aircraft Co.

Commercial castings that have been consistently made of zinc-base alloys are now being produced in aluminum because aluminum-base die castings are cheaper and perform more satisfactorily in service. Vernon Swan, ingot product supervisor, Reynolds Metals Corp., guest speaker at the January meeting of the Buffalo Chapter, showed case histories of how this fact has been proven in several industries during the last few years in his talk, "Trends in Aluminum Casting Applications".

According to Mr. Swan, the basic differences in price arise from the relative specific gravity of the materials and the fact that the aluminum is competitive on a poundage basis with the zinc alloys. Furthermore, the technical difficulties associated with plating of aluminum die castings have been overcome and most commercial platers will now accept a production plating job for aluminum-base castings at the same price as they would the equivalent zinc-base die castings. With respect to plating, Mr. Swan explained that the secret of the process lies in the preparation of the casting and the subsequent zinc strike coating which must be applied as the bonding layer between the aluminum casting and the subsequent final plate coating. If the zinc layer is controlled to an extremely fine-grained thin layer, then very ductile plate coatings can be applied.

A very recent development in the thinking of the aluminum casting industry is the preparation of complicated castings through the brazing of simple castings into the final configuration. The most striking example of this type of thinking is current development work in the automotive industry in which motor blocks are now being made by brazing. Mr. Swan believes that great progress will be made in 1953 in the development of low-temperature brazing alloys to further extend this field of activity. He indicated that the base casting alloys for these types of applications would be those that do not require a solution heat treatment following the brazing operation. For this reason, the high-zinc alloys look promising.

The extrusion operations of the Reynolds Metals Corp. were covered by Mr. Swan through the presentation of their latest film, "Aluminum Extrusion".

Compliments

To FREDERICK COOPER, for a great many years the efficient secretary of the Philadelphia Chapter A.S.M., on his acceptance of a position as chief metallurgist for Fairmont Steel Corp. of Philadelphia.

♦ ♦ ♦

To LOUIS MOSES, mill engineer, Bethlehem Steel Corp., who won the $300 first prize in the 1951 Kelly Award competition sponsored by the Association of Iron and Steel Engineers for his paper "A Report of Rolling Experiences", and to JOHN L. YOUNG, vice-president in charge of engineering for U. S. Steel Corp., whose paper "Continuous Seamless Pipe Mill" was a runner-up in the competition. Mr. Young has recently been elected president of the A.I.S.E.

♦ ♦ ♦

To JAMES S. KIRKPATRICK on his election as president of the Magnesium Association. Mr. Kirkpatrick is director of research and development for Brooks & Perkins, Inc., Detroit.

♦ ♦ ♦

To JOHN M. LESSELLS, associate professor of mechanical engineering at Massachusetts Institute of Technology, on his honorary membership in the American Society of Mechancal Engineers "for outstanding contributions to the development of applied mechanics within the A.S.M.E."

♦ ♦ ♦

To C. J. P. BALL, chairman of Magnesium Elektron, Ltd., and G. V. RAYNOR, professor of metal physics, University of Birmingham, England, on being elected vice-presidents of the Institute of Metals.

Discusses Philosophy Of Industrial Research

Reported by P. H. Parker

Superintendent of Roll Foundry
Continental Foundry and Machine Co.

David Swan, assistant director of research, Union Carbide and Carbon Research Laboratories, Inc., presented a talk on the "Philosophy of Research" before the January meeting of the Calumet Chapter.

Starting with the premise that research springs from the desire for innovation, Mr. Swan outlined the organization, purpose, programming, and working of an industrial research group.

He stated that the concept of industrial research originated in the 19th century when individuals provided capital whereby innovators and inventors were furnished with a livelihood and tools, profits of the joint enterprise being jointly shared. Present industrial research is an expansion of this concept, so that now large teams of scientists, inventors and technologists are supported with the idea of transforming ideas into profits.

The programs of various groups are generally limited to the field covered by the sponsoring organization. The purpose of such research programs usually comes under one of three categories: (*a*) to increase the quality or decrease the cost of currently produced products with the use of existing facilities; (*b*) to discover new uses for current products; and (*c*) to develop new products.

The development of new ideas requires a research organization staffed by widely diverse personnel. First, there are the innovators, or idea men. The ideas of this group, however, are not necessarily practical from a standpoint of ultimate result or methods of development. Second comes the technologist who can objectively evaluate the worth of an idea and has the ability to work out its practical development. Then there is the administrator who can sell the idea to the sponsor and smoothly organize and manage the efforts of innovators and technologists.

Exploitations of the results of research requires that the potentialities of the development be sold to a management group and that the production possibilities be sold to an operating group. This function is usually carried on by a development group which works in close cooperation with the research organization.

To meet its objectives, an industrial research organization must maintain a desirable research atmosphere, and its researchers must have freedom to publish their findings and to discuss them and interchange ideas. They also must receive a fair and adequate remuneration for their efforts.

New Pilot Plant Opened

Apex Smelting Co. of Chicago has announced the formation of the National Metallurgical Corp. to construct and operate its pilot plant at Springfield, Ore., for the production of aluminum-silicon metal from clays. The American Smelting & Refining Co., with principal offices in New York, has acquired a half interest in the new corporation. It is contemplated that the plant will be in production by June 1.

New Films

Atomic Films

Several 16-mm. color films are available which show the effects of the atomic bombing in Japan and the various weapons tests at Eniwetok and Bikini. Most of the films are in Kodachrome with sound and run from 20 to 30 min. They are available (cost free) on loan to A.S.M. Chapters. Address Elton P. Lord, Public Information Service, U. S. Atomic Energy Commission, 1901 Constitution Ave., N.W., Washington 25, D. C. for descriptive pamphlet.

Portrait of an Enterprise

The Dravo Corp. has completed a new 30-min., 16-mm. sound film in color documenting many of the firm's diversified activities serving nearly every segment of industry. The movie typifies modern American industrial engineering firms. Emphasis is placed on on-the-job scenes of heavy construction projects, river locks, dams, bridges. The film is available without charge for showing to engineering groups, schools and colleges and other interested organizations. Write to: Advertising Dept., Dravo Corp., Neville Island, Pittsburgh 25, Pa.

Ten Years Ago

Quotes From *Metals Review*
January 1943

"Spontaneous applause at the close of the picture again evidenced the great popularity of the A.S.M. film on 'Metal Crystals' when it was shown at a recent meeting of the Puget Sound Chapter."

Wilson and Past Chairmen Enjoy Western Night

National President Ralph L. Wilson Was Guest of Honor at the Texas Chapter's Combined National Officers Night, Past Chairmen's Night, and Western Night in January. At the speaker's table are, seated, from left: Harold Schmid; W. E. Burndrett; Mr. Wilson; M. W. Phair, present chairman; F. M. Whittlinger; A. R. Oakley, Jr., secretary-treasurer; and, standing, from left: H. B. Lilley; H. C. Dill; W. A. Kuenemann; C. F. Lewis; K. P. Campbell; G. G. Harrington; W. W. Hampton; C. H. Shapiro; and R. W. Schlumpf. Unless indicated otherwise, all of the persons illustrated are past chairmen of the Texas Chapter (Photo by Lee Dolan)

Manganese Recovery Processes Outlined

Reported by Eugene M. Smith

Development Engineer
Youngstown Sheet & Tube Co.

Shadburn Marshall, research associate at U. S. Steel Research Laboratories, was the principal speaker at the Mahoning Valley Chapter's annual Openhearth Night in January. Dr. Marshall spoke on "Recent Experiments in the Recovery of Manganese".

About 15 lb. of manganese is used in each ton of steel produced. The United States currently imports nearly 90% of the 1.7 million tons of manganese consumed each year. Most of the metal, which formerly came from Russia, now is supplied by India, Africa and Brazil.

Attempts to free ourselves from the limitation of importing manganese from unsociable but socialistic countries are predicated on the relatively large proportions of manganese ending up in the openhearth slag dumps. Research on manganese recovery methods has tended to proceed in the three most common extractive metallurgical fields, pyrometallurgy, leaching, and chlorination.

At the U. S. Bureau of Mines in Pittsburgh, Russel C. Buehl and his associates have demonstrated a pyrometallurgical method of recovering manganese from openhearth slag.

The U. S. Government has made the procedure available for commercial development. Mangaslag, Inc., is planning to build a million dollar plant to produce 30 tons of manganese daily from 500 tons of slag. Operation is expected to start sometime in June.

At College Park, the Bureau of Mines is evaluating a leaching process. This is a combination of the Sylvester and Dean processes. Slag is first roasted in the presence of lime and then leached with an ammonium carbonate solution. Up to 1000 lb. of clinker per day have been made. Smaller scale experiments indicate possibilities of recovering 80 to 86% of the manganese.

At Armour Research Institute, solid and gaseous chlorides are being tried. Small-scale experiments indicate that 90% of the manganese in the slag can be recovered.

For the utilization of each of these newly developed processes, stockpiling of flush slags would be desirable. Present slag dumps contain much contaminating material which would detract from their use as a source of suitable manganese-rich slag.

Lester Gives Sauveur Memorial Lecture

Horace H. Lester (Left), Chief of the Research Branch, Watertown Arsenal Laboratory, Is Shown Receiving a Memento of His Lecture "Albert Sauveur, an Appreciation" From Carlton G. Lutts, Technical Chairman, After Presentation of the Annual Albert Sauveur Memorial Lecture in Boston in January

Reported by William F. Collins

Carr Fastener Co.

The Boston Chapter held its 13th Annual Sauveur Memorial Lecture in January. The speaker of the evening was Horace H. Lester, chief of research branch, Watertown Arsenal Laboratory. His topic was "Albert Sauveur, an Appreciation".

Dr. Lester gave a long and interesting history of Albert Sauveur, the man, the research student, the teacher and the scientist, tracing his development through his early years to his final achievements in the metallurgical world. He traced the development of the Sauveur Memorial Room at National Headquarters in Cleveland, which now stands as a lasting memorial to the man who "more than any other established the principles of heat treatment about which the Society was built".

Dr. Lester proceeded to develop, step by step, the important phases in the life of Sauveur, beginning with his early studies of metallography, and mentioning the numerous papers and books produced by Sauveur which have long influenced metallographic studies. In the research field, Sauveur believed that basic research calls for high concentration, careful, patient thinking and experimentation, a relaxed mental approach, and a complete lack of the tensions that are involved in the consciousness of urgent necessity.

Dr. Lester's tribute to Albert Sauveur recalled to the minds of the members present that it was Sauveur's ability to transfer his mental concepts into practical applications that earned for him the title of "Father of American Metallography".

Shell Molding Process Topic of New York Talk

Reported by I. M. Hymes

International Business Machines Corp.

A. W. Calder of Builder's Iron Foundry spoke on "Shell Molding Techniques" at Sustaining Members Night of the New York Chapter in December.

Mr. Calder's talk was supplemented by slides which showed the equipment and methods employed at Builder's Iron Foundry. The main advantage of the process, which the speaker stressed throughout his talk, is the elimination of machining due to closer tolerances (0.005 in. per linear in.) and superior surface finish. With the methods used at Builder's, the raw casting by shell molding would cost about 20% more than by conventional squeeze casting.

A discussion period led by B. N. Ames of the New York Naval Shipyard brought out that the eventual mechanization of the shell molding process will lower the cost differential of the raw casting, while maintaining the advantages of closer tolerances and superior surface finish.

Letter From a Professor

The letter below was recently received from A. G. Guy, associate professor of metallurgical engineering at Purdue University.

> The 500 copies of "Does Engineering Appeal to You" sent to me by the Society are just what I needed to make the lecture on metallurgical engineering something that the students will think about for a while.
>
> I should tell you that this is the kind of service that gives the American Society for Metals its outstanding reputation among metallurgists.

Heat Treating Processes Compared

Enjoying the Social Hour After the Technical Lecture Presented Before the Dayton Chapter in January Are, From Left: R. L. Moncrief, Frigidaire Division of General Motors Corp., Chairman; O. E. Cullen, Chief Metallurgist, Surface Combustion Corp., and L. B. Rosseau, Assistant Vice-President, Ajax Electric Co., Inc., Guest Speakers; and Jacob Gantner, National Cash Register Co., Vice-Chairman. (Photo by D. C. Heckard)

Reported by D. C. Heckard
Research Laboratories
Armco Steel Corp.

Save the surface and you save the metal, was the theme of the January meeting of the Dayton Chapter. The group was privileged to hear both sides of the "Salt Bath or Controlled Atmosphere" story presented by O. E. Cullen, chief metallurgist, Surface Combustion Corp., and L. B. Rosseau, assistant vice-president of Ajax Electric Co., Inc.

Mr. Cullen stated that controlled-atmosphere heat treating was developed about 25 or 30 years ago when it was first determined that in burning fuel gas with air, the composition of the resulting gas could be controlled. It is thus possible to clean-anneal by using, for instance, a partially combusted fuel gas as the surrounding atmosphere to prevent scaling, and thus to eliminate pickling.

The metallurgist is primarily interested in being able to obtain an oxidizing, neutral or reducing atmosphere for all metals, and a carburizing, neutral or decarburizing atmosphere for steel.

One gas that is easily available is flue gas resulting from essentially perfect combustion; after cooling, it has a composition of about 12% CO_2, 3% H_2O, and 85% N_2. This mixture is extremely oxidizing. In the steel industry, gas generator equipment absorbs out the CO_2, dries out the H_2O, and ends up with essentially nitrogen. If just a trace of CO and H_2 is present, the result is a non-explosive, slightly reducing atmosphere gas of many uses. Or, by a catalytic process, it is now possible to convert the flue gas to 5 to 10% H_2, and 90 to 95% N_2 in a nitrogen-hydrogen generator.

Another group consists of the catalytic generator gases of the edothermic type formed from a hydrocarbon gas and air. A widely used gas of this type is RX gas for carbon control in carburizing or carbonitriding; it contains about 20% CO, 40% H_2 and 40% N_2. Homogeneous carburizing can be done readily by this gas to build up carbon throughout thin metal sections. For example, snap fasteners, clips, spring parts and other stampings which are made from SAE 1010 steel can be hardened up to Rockwell C-61.

These atmospheres can be used for dry cyaniding or carbonitriding.

Mr. Rosseau stated that salt bath heating is competitive to controlled atmospheres, though each has certain advantages. Salt bath compositions are available for a wide range of desirable temperatures. In general, they are liquids with specific gravities two to three times that of water. Metal articles will therefore sink beneath the surface if their shape permits.

The design of metal parts should be carefully planned, so that no salt will be trapped on removal from the bath. Heating is uniform and distortion can therefore be kept to a minimum. The initial "muff" of frozen salt formed on the article upon immersion acts as an insulating layer and gives the effect of an automatic preheating. Parts are also protected by the liquid film from contact with the air in passing from the salt bath to the quenching medium, and the resulting surface is entirely free from scale, with only a tarnish resulting principally from the quenching medium used. Well-chosen samples illustrating Mr. Rosseau's point were exhibited.

Isothermal treatments such as austempering and martempering are advantageously carried out in a salt bath. As to equipment, ceramic pots are most satisfactory except when the salts contain carbonates or carbonates are formed. Steel pots are satisfactory at low temperatures.

Speakers Discuss Cutting Lubricants

Shown at a Joint Meeting in November of the Hartford Chapter of the American Society for Metals and the American Society of Tool Engineers Are, From Left: Henry Kurlyea, Chapter Chairman A.S.T.E.; C. D. Flemming, Speaker; Henry J. Fishbeck, Technical Chairman; Paul E. Brunberg, Speaker; and Harold F. Sprague, Chairman of the Hartford Chapter A. S. M.

Reported by Philip Pearson
Metallurgist, Fafnir Bearing Co.

The November meeting of the Hartford Chapter was held jointly with the American Society of Tool Engineers. C. D. Flemming of Socony-Vacuum Laboratories discussed "Metal Cutting Lubricants and Coolants". Paul E. Brunberg of the CO-2 Development Co., Detroit, also addressed the meeting.

Mr. Flemming emphasized that improved cutting fluids will lengthen tool life, reduce friction, and allow closer dimensional tolerances, thereby cutting production costs. He discussed cutting lubricants containing sulphur and chlorine which provide a rupture-proof film, and explained that the active sulphur of a cutting fluid is more significant in metal-cutting operation than the total sulphur content. He also discussed the effect of built-up edges used to protect tools and the effects of different fluids on the shear angle during cutting.

Meet Your Chapter Chairman

J. H. Wernick

A. M. Bounds

S. A. Duran

PENN STATE

JACK H. WERNICK was born and raised in St. Paul, Minn. He received both his B.Met.E., and his M.S. degrees from the University of Minnesota. He is married and has two daughters, 3 years and 6 months old. He worked at Los Alamos, New Mexico during World War II and is presently employed as an instructor of metallurgy at Pennsylvania State College.

Mr. Wernick's hobby is photography, but he spends most of his free time playing with his children, or working on his Ph. D.

INLAND EMPIRE

SERVET A. DURAN, chairman of the Inland Empire Chapter A.S.M., is a native of Turkey, the son of a Turkish civil engineer. He came to the United States in 1939 and citizenship proceedings are presently in progress.

Servet attended a Lyceum (high school) in Istanbul, where the instruction was given in French. He received his B.S. degree in mining engineering from the Missouri School of Mines and Metallurgy in 1943, A.M. in metallurgy in 1945, and degree of engineer in 1946 from Stanford University. He was appointed to the Stanford staff as a laboratory assistant in physical metallurgy in charge of metallography courses, and later became an instructor in physical metallurgy at the State College of Washington. He has been assistant professor of physical metallurgy at Washington since 1949, and has been active in night school teaching at Spokane, and as a lecturer of the joint WSC-ASM educational courses for men of the Inland Empire territory industries.

Servet is married to a California girl, and his family includes a 3-year old girl and a 7-month old boy. He likes good music and has a collection of ballet music recordings, and he enjoys swimming and playing tennis.

Mr. Duran was a member of the Inland Empire Chapter's executive committee in 1949-50, a secretary-treasurer of the chapter in 1950-51, and vice-chairman, 1951-52.

PHILADELPHIA

A. M. BOUNDS was born in Philadelphia. He attended Lehigh University, where he graduated with a B.S. degree in metallurgical engineering in 1933, after which he took a position for a short time before returning to Lehigh for further study. In 1936 he graduated with an M.S. degree in metallurgical engineering.

Mr. Bounds was employed by Olney Foundry Division of Link Belt Co. from 1933-34. In 1936 he took a position with Superior Tube Co., where he now holds the position of chief metallurgist in charge of the technical division, which includes the metallurgical and electronics laboratories. He has been working entirely in the field of metallurgical engineering, never as a metallurgist. He founded the metallurgical department at Superior Tube Co., has worked extensively with the fabrication techniques for reactive metals, starting with zirconium in 1944, and going to titanium, vanadium, molybdenum and several of the reactive metals since then. He is a member of the A.S.M. Educational committee, and on the committee for Science and Arts of the Franklin Institute.

Mr. Bounds has a wife, Marguerite, one daughter, Cynthia, and two sons, Bruce and Pierce. His chief hobby is a recently acquired 38' cabin cruiser Cymar, which keeps him busy and supplies plenty of fun and relaxation for the whole family. Other hobbies include photography; he has a collection of approximately 500 colored slides covering Europe, parts of Canada, the Caribbean and the United States. He also collects good recordings. He will travel at the drop of a hat, traveling for the most part by airplane.

Mr. Bounds is the author of four papers and one patent, with others pending, and is a member of several technical societies.

N. Y. Hears How Rare Earths Influence Ferrous Metal Properties

Reported by I. M. Hymes
International Business Machines Corp.

At the January meeting of the New York Chapter, N. F. Tisdale, Jr., spoke on the "Influence of Rare Earths on Properties of Ferrous Metals".

Since it apepars that mischmetal or the oxides from which it is reduced is the prime rare earth addition agent, Mr. Tisdale's talk dealt exclusively with these high cerium-lanthanum materials, which he termed L-metal and T-compound, respectively.

In nodular iron, Mr. Tisdale indicated that mischmetal could counteract deficiencies in either scrap or pig concerning the nucleation which promotes spheroidal graphite. The investigations in connection with steel are an attempt to replace imported alloying elements with the potentially more available rare earths.

Manufacturers of austenitic stainless steels are the main users of rare earths on a production scale at the present time, and indications show that before too long low alloy steel manufacturers will also have a use for them.

New Steel Shot Plant

American Wheelabrator & Equipment Corp., Mishawaka, Ind., has completed construction of a new plant specially designed for the manufacture of Wheelabrator Steel Shot, a new blast cleaning abrasive produced under the Company's patented process.

The plant, the largest of its kind in the world, is completely mechanized and is equipped with automatically controlled heat treating equipment to assure constant uniformity of product.

Oak Ridge Completes Welding Research Course

The Oak Ridge Chapter has recently completed an educational course on the "Importance of Temperature Measurement in Welding Research".

Three lectures were presented by the speakers, E. F. Nippes, associate professor and supervisor of welding research, Rensselaer Polytechnic Institute, and W. F. Savage, assistant professor, Rensselaer Polytechnic Institute and supervisor of the Army flash welding program. The speakers showed the application of metallurgical principles to the solution of welding problems in the fields of arc, spot and flash welding.

Dr. Nippes and Mr. Savage were two of the co-authors who were awarded first prize for a paper submitted in a national welding contest which was recently sponsored by the Resistance Welding Manufacturers Association.

Outlines Human Relations Program at Canton-Massillon

Reported by J. M. Brunner
Laboratory Metallurgist
Republic Steel Corp.

Gaige B. Paulsen, professor of psychology and supervisor of testing and counseling at Ohio University, spoke to about 100 members and guests of the Canton-Massillon Chapter at its annual Sustaining Members night in February. Ralph L. Wilson, national president was also present.

Dr. Paulsen discussed "Human Relation Conferences With Industrial Concerns", citing some of the incidents and results obtained with this type of training program. He explained the Keeler polygraph or "lie detector" and its uses and limitations in the human relations field.

Gordon Meldrum, chapter chairman, presented pen and pencil sets to six members who recently completed a series of educational lectures on the "Principles of Heat Treatment". The lecturers were: S. W. Poole, educational chairman, Republic Steel Corp.; D. Niconoff, Republic Steel Corp.; A. Christianson, Timken Roller Bearing Co.; R. L. Nichols, Timken Roller Bearing Co.; C. Shelton, Tyson Bearing Corp.; and G. B. Trumble, Ford Motor Co.

Iowa-Illinois Chapters To Hold Regional Meeting

The Iowa-Illinois Regional A.S.M. Conference will be held in Davenport, Iowa, on Apr. 2-3. The Cedar Rapids, Des Moines, Peoria, Rockford, and Tri-City Chapters of the Society are sponsoring this meeting which will cover "Metal Processing — Trends and Developments". C. W. Ray, Deere & Co., is chairman.

A tentative schedule has been drawn up, as follows:

Apr. 2—Panel discussion on "Applications and Heat Treatment of Modern and Emergency Constructional Steels"; 'Metallurgical Progress in Israel", by H. Bornstein; panel discussion on "Cold Working of Metals", and a banquet at which A.S.M. President R. L. Wilson has been invited to speak.

Apr. 3—Panel discussion on "Application and Substitution of Nonferrous Metals"; "Role of Rock Island Arsenal in the Iowa-Illinois Area" by W. W. Warner; and a panel discussion on "Design Evaluation as Related to Process and Material".

The panel members for each subject have been asked to cover their experience and practices in a summarizing 15-20 min. talk. Each panel will have five members chosen from qualified technical personnel in each of the industries in the area included by participating chapters.

Testing Machine History Presented at Wichita

Reported by T. F. Neal
O. A. Sutton Corp.

The Wichita Chapter heard K. R. Wickstrom, field engineer of the Baldwin-Lima-Hamilton Corp., speak on "What's New in Testing Equipment?" in January. He gave a background on the development of physical test machines and discussed new equipment.

Wilson and Student Award Winner Honored

The January Meeting of the Milwaukee Chapter Featured R. L. Wilson, A. S. M. National President, Who Gave a Talk on "High-Carbon Steels in Engineering Applications". Mr. Wilson presented certificates to new Silver Jubilarians L. E. Grant, L. J. Larson, N. E. Nelson, and the Chain Belt Co. Also present was Henry Fuller, Shorewood High School, winner of a Science Achievement Award for his paper on "Electro Tester for Carbon Content of Steel." Shown above are, clockwise from microphone: L. E. Grant; Henry Fuller; R. P. Daykin, chapter director; E. G. Guenther, secretary-treasurer; F. L. Banta technical chairman; Mr. Wilson; J. M. Beyerstedt, chairman; and E. Gammeter, vice-chairman. (Photo by M. A. Wallesz)

THIRTY YEARS AGO

Quoting from the May 1923 issue of the *Transactions*: "The Honorable HERBERT HOOVER, secretary of the Department of Commerce, under which falls the United States Bureau of Standards, has announced the appointment of DR. GEORGE K. BURGESS† as director of the Bureau of Standards at Washington." (Dr. Burgess was elected to the A.S.M. presidency the following year.)

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The Los Angeles Chapter of the Society was organized in May 1923. Officers were ROBERT B. DUNSMORE, chairman; E. C. LEMUNYON, vice-chairman; and JAMES H. KNAPP†, manufacturers' representative, secretary-treasurer.

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Prominently featured in the section of the *Transactions* devoted to chapter news is an account of an important project sponsored by the Indianapolis Chapter in the winter of 1922-23. This was an evening lecture and laboratory course running for 15 weeks on fundamentals of metallurgy. Director of the course was H. B. NORTHRUP, formerly of the faculty of Pennsylvania State College, and at that time chief metallurgist of Diamond Chain Co. and vice-chairman of the Indianapolis Chapter (later director of extension courses at Penn State, and now retired).

—30—

The important progress made in the fatigue of metals investigation at University of Illinois forms the subject of an editorial in the June 1923 issue. Financial support was provided by General Electric Co., Allis-Chalmers Mfg. Co., Copper and Brass Research Association, University of Illinois, National Research Council and the Engineering Foundation, and the investigation was under the immediate charge of Prof. H. F. MOORE and under the general supervision of Prof. ARTHUR N. TALBOT of the department of theoretical and applied mechanics at the University.

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The Nominating Committee reported the following candidates for national officers in 1923: For president, GEORGE KIMBALL BURGESS† of the National Bureau of Standards; for second vice-president, ROBERT M. BIRD†, engineer of tests, Bethlehem Steel Co.; for treasurer, ZAY JEFFRIES, in charge of the Cleveland Section of the research bureau, Aluminum Co. of America, and consulting metallurgist for National Lamp Works of General Electric Co. (now retired—more or less!); and for director, J. FLETCHER HARPER, research engineer, Allis-Chalmers Mfg. Co. (now vice-president of Globe-Union Mfg. Co.).

† Deceased.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Apr. 20	Engineers Club	L. F. Yntema	Refractory Metals
Boston	Apr. 10	Hotel Shelton	H. H. Harris-S. W. Motherwell	Castings vs. Forgings
British Columbia		Stanley Park	V. N. Krivobok	(See Oregon)
Buffalo	Apr. 9	Sheraton Hotel	L. P. Tarasov	Grinding Defects
Calumet	Apr. 14	Phil Smidt	L. Heard	Fire Magic
Canton-Massillon	Apr. 7	Mergus Restaurant	I. Harter, Jr.	Continuous Casting of Steel
Carolinas	Apr. 23	Winston-Salem, N. C.	R. L. Wilson	Engineering Alloy Steel (Charter Night)
Chicago	Apr. 13	Furniture Mart	H. F. Taylor	New Developments in Castings
Cincinnati	Apr. 15	Columbus		Tri-Chapter Meeting Metallurgy in Aircraft
Cleveland	Apr. 6	Hollenden Hotel	W. P. Sykes	"Zay Jeffries' Night"
Columbia Basin		Richmond Pub. Lib.	V. N. Krivobok	(See Oregon)
Columbus	Apr. 15	Battelle Memorial Institute		Tri-Chapter Meeting—Metallurgy in Aircraft
Dayton	Apr. 15	Columbus		Tri-Chapter Meeting
Detroit	Apr. 13	Rackham Bldg.	N. O. Kates	Practical Heat Treating
Eastern New York	Apr. 14			Joint Meeting With A.F.A.
Georgia	Apr. 6	Atlantic Steel Co.	Panel Discussion	How You Can Select Toolsteels
Hartford	Apr. 14	Bond Hotel	J. C. Redmond	Engineering Properties of Cemented Carbides
Indianapolis	Apr. 20	McClarney's Restaurant	A. T. Colwell	Hi-Jet Systems for Increasing Tool Life
Inland Empire	Apr. 20	Spokane Hotel	V. N. Krivobok	(See Oregon)
Kansas City	Apr. 15	University of Kansas	C. B. Carpenter	
Lehigh Valley	Apr. 10	Allentown	R. S. Radcliff	Titanium, A New Metal of Construction
Los Alamos	Apr. 29		Ray McBrien	Electron Microscope Studies of Lubricating Oils
Louisville	Apr. 7	Korfhage's Tavern	Herman Hanink	Aircraft Engine Materials
Mahoning Valley	Apr. 1	Post Room, V.F.W.	I. Harter, Jr.	Continuous Casting of Steel
Milwaukee	Apr. 21	City Club	M. M. Frocht	Stress Concentrations and Their Significance in Failure
Minnesota	Apr. 16	Covered Wagon	W. T. Baird	Stamping
Montreal	Apr. 7	Queens Hotel	J. B. Russell	Aluminized Iron and Steel
New Haven	Apr. 16	Waverly Inn, Cheshire Pratt & Whitney, North Haven	F. L. Laque	Some Corrosion Problems Plant Visit
New Jersey	Apr. 20	Essex House Hotel	Morris Cohen	Heat Treatment of Steel
New York	Apr. 13	Schwartz Restaurant	B. L. Averbach	Dimensional Stability of Steels
Northern Ontario	Apr. 15		Fred Washburn	
Northwestern Pennsylvania		Youngville	B. W. Gonser	Use of Unusual Metals in Industry
Notre Dame	Apr. 8	Eng. Bldg.	F. G. Tatnall	Is Testing Necessary?
Oak Ridge	Apr. 15	K. of C. Hall	R. L. Fullman	Grain Growth
Ontario	Apr. 10	St. Catherines	C. W. Lockwood	Heat Resisting Alloys
Oregon	Apr. 24	Congress Hotel	V. N. Krivobok	Properties of Metals at Elevated Temperatures
Ottawa Valley	Apr. 7	Phys. Met. Res. Lab.	H. B. Chambers	Classification and Selection of Toolsteels
Penn State	Apr. 14	State College	F. G. Tatnall	New Testing Tools and Methods
Philadelphia	Apr. 24	Eng.'s Club	E. A. Gee	Titanium
Pittsburgh	Apr. 9	Roosevelt Hotel	W. D. Philbrook	Recent Contributions of Research to Ferrous Process Metallurgy
Puget Sound	Apr. 29	Seattle	V. N. Krivobok	(See Oregon)
Purdue	Apr. 25	Purdue Union		Statewide Symposium
Rhode Island	Apr. 1	Eng. Soc. Bldg.	H. T. Clark	Titanium
Rochester	Apr. 16-18	Seneca Hotel		(Lower Lakes Regional Spring Conference With Buffalo, Northwestern Pennsylvania, Ontario, Rome, Southern Tier and Syracuse Chapters)
Rockford	Apr. 22	Faust Hotel	H. E. Boyer	Application of Newer Metal Knowledge
Rocky Mt. Denver Group	Apr. 17	Oxford Hotel	S. L. Hoyt	Metallurgical Experiences in Europe
Pueblo Group	Apr. 16	Minnequa Club	S. L. Hoyt	Metallurgical Experiences in Europe
Rome	Apr. 6	Elk's Club	A. F. Holden	Salt Bath Heat Treatment and Descaling
St. Louis	Apr. 20	Stratford Hotel, Alton, Ill.	T. A. Pruger	Stainless Alternates for Chromium-Nickel Stainless Steels
Southern Tier	Apr. 16-18	Rochester, N. Y.		(See Rochester)
Springfield	Apr. 20		W. E. Bancroft	Practical Heat Treatment of High-Speed Steel Tools
Syracuse	Apr. 7	Onondaga Hotel	Haig Solakian	Salt Baths and Their Heat Treating Applications

Terre Haute	**Apr. 25**	Purdue University,		(Statewide Symposium)
Texas	**Apr. 7**	Ben Milam Hotel	**A. O. Schaefer**	Manufacture and Heat Treating of Forgings
Toledo	**Apr. 9**	Maumee Yacht Club	**R. Herold**	Shell Molding
Tri-City	**Apr. 2-3**	Rock Island Arsenal	**R. L. Wilson**	Regional Conference
Tulsa	.....	Michaelis Cafeteria	**J. A. Harrington**	Precision Measurement
Utah	**Apr. 23**	Carleton Hotel	**N. K. Koebel**	Furnace Atmospheres and Heat Treatment
Warren	**Apr. 10**	Cadillac Tank Plant G. M. C., Cleveland		Plant Visit
Washington	**Apr. 13**	Naylor's Rest.	**J. D. Nisbet**	High-Temperature Metallurgy
Western Ontario	**Apr. 10**	Cobblestone Inn, London	**S. R. Cope**	Die Design and Stampings
West Michigan	**Apr. 20**			Plant Tour
Wichita	**Apr. 21**	K. of C. Hall	**Prof. Rose**	Crystal Formation
Worcester	**Apr. 15**	Wachusett Country Club		Ladies Night
York	**Apr. 8**	Gettysburg		Ladies Night

Describes Diffusion Mechanism in Metal Sintering at Dayton

Reported by D. F. Gerstle

Delco Products

Copper wire wound on a spool to give point contact with other turns and heated to sintering temperature showed upon examination that the area of contact between the wires increased and the triangular voids became circles of decreased area. B. H. Alexander, engineering manager, Electronics Division, Sylvania Electric Products, Inc., illustrated with slides this and related research information when he spoke in Dayton in December on "Diffusion Mechanism in Metal Sintering".

The initial rate of decrease in size of the voids is greater the higher the temperature. Grain boundaries connecting the voids disappear after a length of time which increases with decreasing temperature. When the grain boundaries disappear, no further decrease in size of the voids occurs. At higher temperatures, the over-all decrease in size of the voids is smaller since the grain boundaries disappear sooner.

In sintering, the area of the surface of the particles diminishes. Small irregular-shaped particles with large surface area are favorable for sintering.

Copper and zinc show a difference in mutual solubility. Copper and zinc wires wound alternately on a spool showed after sintering that the copper wires enlarged and the zinc wires were reduced in size with voids formed in the zinc. Zinc appears to diffuse six times as readily into copper as copper does into zinc.

Representatives Appointed

W. G. Barstow and his son John M. Barstow of the W. G. Barstow Co., Minneapolis, have been appointed exclusive representatives throughout the state of Minnesota and western Wisconsin and the extreme western part of Iowa for the Alloy Engineering and Casting Co., manufacturers of stainless steel and heat resistant alloys.

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A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio

Stewart J. Stockett, Technical Abstracter

Assisted by Claudia Belknap, Ardeth Holmes and Members of the Translation Group

A GENERAL METALLURGICAL

40-A. Developments in the Iron and Steel Industry During 1952. I. E. Madsen. *Iron and Steel Engineer,* v. 30, Jan. 1953, p. 123-161.

General discussion which includes foreign plants, raw materials, blast furnaces, steelmaking, rolling mills, finishing, furnaces and controls, materials handling, and power. Photographs, diagrams, and tables. (A general, CI, ST)

41-A. Early History of Titanium. M. A. Hunter. *Journal of Metals,* v. 5, sec. 1, Feb. 1953, p. 130-132.

Reviews laboratory interest during 1906-1908 for producing Ti in pure and usable form. (A2, Ti)

42-A. The Free World's Metal Resources and Expected Demand. Alfred J. Murphy. *Metal Progress,* v. 63, Jan. 1953, p. 68-73, 172, 174, 176.

Principles which affect the availability of metals and influence commercial utilization efficiency. Production and consumption statistics; mineral reserves. Tables. (A4, Fe, ST, EG-a)

43-A. Resurrection of Metallurgy in Italy. Antonio Scortecci. *Metal Progress,* v. 63, Jan. 1953, p. 89-93, 176, 178.

Briefly sketches prewar situation as an introduction to postwar recovery. Iron ore reserves, nonferrous statistics, iron and steel foundries, applied research. Tables and graphs. (A general)

44-A. Advances in Nonferrous Metals in Great Britain Since 1945. L. G. Beresford. *Metal Progress,* v. 63, Jan. 1953, p. 103-108.

Postwar techniques of deep drawing, rolling, extrusion, die casting, cold welding, soldering by ultrasonics, and metal finishing. (A general, EG-a)

45-A. Metallurgical Research in the Netherlands. J. D. Fast. *Metal Progress,* v. 63, Jan. 1953, p. 109-111.

Research on metal fabrication techniques and utility of metals and alloys. Studies of metallic conductivity of heat and electricity. Deep drawing, permanent magnets, gases and metals, hardening by internal oxidation, welding research. (A9)

46-A. Metal Industry in Japan. *Metal Progress,* v. 63, Jan. 1953, p. 112-114, 178-179.

Postwar problems of iron and steel industry. Mineral resources of Japan are emphasized. (A general, B10, ST)

47-A. A Combined Water Softening and Plating Waste Treatment Plant Operation. I. D. Cox. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 18-23.

Advantages of combining the two plants; Cr waste treatment, waste steel pickling liquor treatment, Na metabisulfite treatment, SO_2 treatment, and cyanide treatment. (A8, L17, Cr, ST)

48-A. A Continuous Method for Treatment of Cyanide Wastes. D. C. Carmichael. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 167-180.

Three methods of disposal, particularly the alkaline chlorination method. Diagrams and tables. (A8)

49-A. Chromate Recovery by Ion Exchange. C. F. Paulson. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 209-217.

Some of the theoretical aspects of treatment of chromic acid solutions by ion exchange for recovery of chromic acid at lowest cost with advantages of water reclamation, elimination of water pollution, increased electrical efficiency, better rinsing, and lowered space requirements. Tables and diagrams. (A8)

50-A. Anodizing Solution Regeneration by Ion Exchange. Durward T. Armstrong. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 218-220.

Shows that chromic acid disposal problem can be handled economically through use of ion exchangers. (A8, L19)

51-A. The Application of Ion Exchange Resins to Metallurgical Waste Problems. F. X. McGarvey. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 289-304.

Theory of operation and examples of use including Cu and brass pickle rinses; Zn recovery; Cr and chromates; cyanide concentration; and Ni, Pb, V, W, and Sn. Purification and regeneration of potential waste solutions. Tables. 15 ref. (A8, Cu, Zn, Cr)

52-A. Combating Oil and Metal Plating Waste Problems at Kelly Air Force Base. F. A. Sanders. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 382-394.

Removing emulsified oils; floating oils and solvents; chromic acid; relatively small amounts of acids containing Ag, Cu, Sn, Cd, brass, and Pb; and cyanides. Diagrams and tables. (A8, L12, Ag, Cu, Sn, Cd, Pb)

53-A. Use of Commercial Hypochlorine Solution as a Treatment Agent for Cyanide. Earl J. Roy. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 419-428.

Gaseous chlorination, Na hypochlorite treatment process, problems of treatment, and continuous hypochlorination. (A8)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

54-A. Metal Finishing Industry Action Committee of the Ohio River Valley Waste Sanitation Commission. W. L. Pinner. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 429-438.

General discussion. (A8)

55-A. Recovery of Chromate and Nickel-Ions From Rinse Waters by Ion Exchange. A. C. Reents and D. M. Stromquist. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 462-480.

Equipment for recovery. Tables and diagrams. 8 ref. (A8, L12, Cr, Ni)

56-A. Progress Report of American Electroplaters Society Research Projects on Plating Room Waste in Three Parts. I. The A. E. S. Research Program. W. L. Pinner. **Part II. Determination of Impurities in Plating Wastes and Plating Baths.** Earl J. Serfass. **Disposal of Cyanide Waters From Plating Rooms.** Walter Zarban, Barnett F. Dodge, and Charles A. Walker. *Proceedings of the Seventh Industrial Waste Conference,* Nov. 1952, p. 518-540.

Includes tables, graphs, and diagrams. 12 ref. (A8, L17)

57-A. Ferrous Metals and World Markets. Review of Last Year's Trends. *Foundry Trade Journal,* v. 94, Jan. 22, 1953, p. 109-111.

Production, rationed steel, raw materials, iron ore, new sources of supply, imports, exports, price movements, and fight for markets. (A4, Fe)

58-A. (Book.) **Automation. The Advent of the Automatic Factory.** John Diebold. 181 pages. D. Van Nostrand Co., 250 4th Ave., New York 3, N. Y. $3.00.

Possibilities, limitations, social, and economic consequences of revolutionary new machines of electronic age. Includes meanings in terms of jobs, cost of goods and services, standards of living, and increased leisure time. (A5, A6)

59-A. (Book.) **Disposal of Spent Sulfate Pickling Solutions.** Richard Hoak. 76 pages. Nov. 7, 1952. Ohio River Valley Water Sanitation Commission, 414 Walnut St., Cincinnati 2, Ohio. $2.00.

Neutralization procedures, methods for recovery of various by-products, and appendices on analytical methods and determination of basicity factors. (A8, L12)

60-A. (Book.) **Metal Industry Handbook and Directory.** 448 pages. 1952. Louis Cassier Co., Ltd., Dorset House, Stamford St., London S.E.1, England. $7.44.

Revised work is recognized source of information and data for those

engaged in production and uses of nonferrous metals. (A10, EG-a)

61-A. (Book.) **Metallurgy.** Edwin Gregory. 284 pages. 1952. Blackie & Son, Ltd., 66 Chandos Pl., London W.C.2, England. 25s.

Introduction to study of metallurgy, both ferrous and nonferrous, useful not only to engineers, for whom book is primarily intended, but to laymen as well. (A general)

62-A. (Book.) **Nonferrous Physical Metallurgy.** Robert J. Raudebaugh. 345 pages. 1952. Pitman Publishing Corp., 2 West 45th St., New York 19, N. Y.

Recent developments in processing, fabrication and application of Al, Mg, Cu, Ni, Cd, Pb, Sn, and Zn and their alloys. Separate chapters on each metal or group of metals, with final chapter on application of powder metallurgy to production of parts. (A general, EG-a)

63-A. (Book.) **The Principles of Physical Metallurgy. Ed. 3.** Gilbert E. Doan. 331 pages. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $5.50

Describes behavior of metals under influence of operations performed upon them in metalworking. Subject of physical metallurgy is approached from standpoint of classical physical chemistry and physics. Properties are explained in terms of atoms and electrons. Material on mechanisms of deformation and annealing was revised and new casting methods were added, including investment and directional solidification methods for sand castings. Revisions include explanation of physical properties of metals in terms of electrons and atoms. (A general)

64-A. (Book.) **Standard Metal Directory. Ed. 13.** 927 pages. Atlas Publishing Co., 425 W. 25th St., New York, N. Y. $15.00.

Directory is divided into four sections: iron and steel plants; ferrous and nonferrous metal foundries; metal rolling mills; and smelters of nonferrous metals. (A10, Fe, ST, EG-a)

65-A. (Book.) **Textbook of Engineering Materials.** Melvin Nord. John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y. $6.50.

An introduction to those primary engineering concepts which the student will find amplified in all further engineering courses. First half of book is general treatment of subject; second half treats specific materials including 111 pages on metals. (A general)

B

RAW MATERIALS AND ORE PREPARATION

30-B. Super Refractories. R. H. Warring. *Ceramics,* v. 4, Dec. 1952, p. 472-476.

Silicon carbide—applications, impingement and abrasion, and comparative costs. (B19)

31-B. Size Reduction. R. V. Riley. *Chemical & Process Engineering,* v. 34, Jan. 1953, p. 8-12, 28.

Grinding theory; operational principles; new constructional materials; crushers, disintegrators, pulverizers, ball mills and jet pulverizers; and special applications of size reduction. Photographs. 59 ref. (B13)

32-B. Tall Oil in Flotation Processes. *Chemical & Process Engineering,* v. 34, Jan. 1953, p. 13-14.

Flotation principle, flotation plants, phosphate rock flotation, Mn ore flotation, Fe ore flotation, and other minerals. 9 ref. (B14, Mn, Fe)

33-B. Cyanidation by Percolation of Battery Tailings From Haoma Lease, Mount Monger, W. A. Arnold Griffin and Evan E. Hughes. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines.* Report No. 491, May 25, 1951, 4 pages.

(B14, Au)

34-B. Cyanidation by Percolation of Battery Tailings From Haoma Lease, Mount Monger, W. A. Supplementary Report. Allan T. Miles. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines.* Report No. 491, Jan. 3, 1952, 5 pages.

(B14)

35-B. Flotation Tests on Tailings From Protheroe Lead Mine, Nabawa, W. A. R. L. Thomas and C. H. Meharry. *Commonwealth Scientific and Industrial Research Orgcnization and Kalgoorlie School of Mines.* Report No. 497, Nov. 27, 1951, 9 pages.

(B14, Pb)

36-B. Continuous Grinding and Filtering Test on Ore From the Copperhead Mine, Bullfinch, W. A. Allan T. Miles and C. H. Meharry. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines.* Report No. 498, Dec. 18, 1951, 3 pages.

(B13, Cu)

37-B. Uaroo Lead Mine, Onslow, Lead and Silver Determinations. R. L. Thomas and C. H. Meharry. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines.* Report No. 501, Jan. 30, 1952, 1 page.

(B14, Pb, Ag)

38-B. Tests to Determine a Method of Treatment of a Gold Ore From Yundamindera, W. A. Allan T. Mills and C. H. Meharry. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines.* Report No. 505, Jan. 2, 1952, 4 pages.

(B14, Au)

39-B. Tabling Tests on Gold-Scheelite Ore From Hannans North Gold Mines, Kalgoorlie. R. L. Thomas and C. H. Meharry. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines.* Report No. 512, Jan. 4, 1952, 2 pages.

(B14, Au)

40-B. Investigations of the Treatment of Battery Tailings at the Golden Arrow Battery, Broad Arrow, W. A. Allan T. Miles and C. H. Meharry. *Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines.* Report No. 518, Jan. 7, 1952, 6 pages.

(B14, Au)

41-B. Sedimentation Analysis of Magnetite. P. G. Meerman and H. J. Odekerken. *Fuel,* v. 32, Jan. 1953, p. 62-66.

Sedimentation analysis of magnetite can be performed using ordinary dispersing agents, such as sodium polymetaphosphate and sodium linolate, after oxidizing the greater part of the material by heating in air. Tables and micrographs. (B14, Fe)

42-B. (English.) **Some Investigations on the Action of Weathering on Sulfide Minerals and Ores.** Sven Bergenfelt. *Jernkotorets Annaler,* v. 136, No. 10, 1952, p. 429-438.

Tests on concentrates and ores, including leaching tests and analyses of mine waters. (B14)

43-B. Refractory Properties of Pacific Northwest Chromites. H. J. Kelly, K. G. Skinner, M. E. Tyrrell, and A. W. Goring. *U. S. Bureau of Mines,* Report of Investigations 4929, Dec. 1952, 28 pages.

Objectives of investigation were to determine inherent physical and chemical characteristics, to prepare dense refractory shapes using Cr ores and concentrates, and to compare refractory qualities of laboratory-prepared shapes with commercial chrome refractories. Tables and photographs. (B19, Cr)

44-B. Formation of Dithionate and Sulfate in the Oxidation of Sulfur Dioxide by Manganese Dioxide and Air. A. E. Back, S. F. Ravitz, and K. E. Tame. *U. S. Bureau of Mines,* Report of Investigations 4931, Dec. 1952, 14 pages.

Detailed information on effects of various factors influencing formation of dithionate in leaching Mn ores with SO_2. Tables. (B14, Mn)

45-B. Metallurgical Coke. J. P. Graham, G. E. Hall and G. W. Lee. *Journal of the Institute of Fuel,* v. 25, Jan. 1953, p. 333-337.

See similar abstract from item 335-B, 1952. (B18, D1, Fe)

46-B. Iron King Uses Close Control. *Mining World,* v. 15, Feb. 1953, p. 26-29.

Beneficiation and control in mining Pb-Zn ore. (B14, Pb, Zn)

47-B. (Book.) **Iron Millionaire: Life of Charlemagne Tower.** Hal Bridges. 322 pages. Univ. of Penna. Press, 3436 Walnut St., Philadelphia 4. $4.75.

Story of one of the great early entrepreneurs, plus story of how Minnesota iron region was first explored and opened up (B10, Fe)

C

NONFERROUS EXTRACTION AND REFINING

26-C. The Extraction of Titanium. H. W. Worner and G. D. Cordner. *Australasian Institute of Mining and Metallurgy Proceedings,* New Series, No. 158-9, 1950, p. 65-87.

Various ways of making Ti. (C general, Ti)

27-C. Practical Notes on Smelting Nickel Ores. C. C. Downie. *Mining Journal,* v. 239, Dec. 26, 1952, p. 738-739.

Efficiency of electric hearth and blast furnace practice in Ni ore smelting. Constructional details in connection with air blast. (C21, Ni)

28-C. Titanium Production at Rem-Cru. Walter L. Finlay, C. E. Newcomb, and M. Anthony. *Journal of Metals,* v. 5, sec. 1, Feb. 1953, p. 140-142.

Melting, rolling, tonnage-style processing, and production of ingots. Photographs. (C21, F23, Ti)

29-C. Titanium Production and Fabrication at Republic Steel Corp. T. E. Perry. *Journal of Metals,* v. 5, sec. 1, Feb. 1953, p. 150-151.

Arc and induction melting techniques. Forging, heat treating, welding. (C5, F22, J general, K general, Ti)

30-C. Arc-Furnace Equipment and Its Operation at the Kennecott Utah Refinery. H. A. Shaw and H. G. G. Whitton. *Journal of Metals,* v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 197-203.

Use of electric-arc furnace for production of tough-pitch, horizontal cast Cu shapes and production of Cu anodes from tank house anode scrap. Photographs. (C21, Cu)

31-C. An Examination of Joule's Work on the Metallurgy of Amalgams. H. J. Axon. *Metallurgia,* v. 47, Jan. 1953, p. 27-28.

Review of Joule's work on constitution of binary alloys of mer-

cury, from the viewpoint of modern knowledge. Alloying of Hg with Fe, Cu, Ag, Zn, Pb and Sn. (C29, Hg)

32-C. The Development of Rare Metals. J. W. Marden. *Journal of the Electrochemical Society,* v. 100, Feb. 1953, p. 37 C-39 C.

History of early experiments and reducing methods now in use. (C general, EG-b)

D

FERROUS REDUCTION AND REFINING

58-D. Progress at Republic Steel Corporation With the High Pressure Blowing of Blast Furnaces. John C. Murray. *Blast Furnace and Steel Plant,* v. 41, Jan. 1953, p. 49-55.

General discussion. (D1, CI)

59-D. Induction Stirrer Applied to Electric Furnaces by Timken. *Blast Furnace and Steel Plant,* v. 41, Jan. 1953, p. 57-62.

Electro-magnetic induction stirrer and other features of Timken's new electric arc furnaces. (D5, ST)

60-D. Production of Controlled Density Steel in Kilns. P. E. Cavanagh. *British Clayworker,* v. 61, Jan. 15, 1953, p. 298-301.

Production and uses. 4 ref. (D8, ST)

61-D. Low-Shaft Blast Furnace. *Iron & Steel,* v. 26, Jan. 1953, p. 5-9. (Translated from *Revue Universelle des Mines,* No. 10, Oct. 1952.)

Direct advantages of the use of low-shaft furnace. (D1, Fe)

62-D. Sponge Iron at Anaconda. Frederick F. Frick. *Mining Engineering,* v. 5, Jan. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 196, 1953, p. 83-84.

Production method. Shows that sponge iron has proved satisfactory both technically and economically. (D8, Fe)

63-D. (German.) **Treatment of Liquid Open-Hearth Steel With Solid Electric-Furnace Slag and the Metallurgical Process During Tapping.** Heinz Siegel. *Archiv für das Eisenhüttenwesen,* v. 23, Nov.-Dec. 1952, p. 417-425.

Reactions in the ladle were examined and ways were determined for letting such reactions occur between time of tapping and of casting into ingots without decrease of purity. (D2, D9, ST)

64-D. (German.) **Desulfurization of Pig Iron With Acid Slags.** Georg Erne. *Mitteilungen,* v. 11, Jan.-June, 1952, p. 1-71.

Synopsis of current theories and results of experiments on reduction of oxygen partial pressure; addition of free Al, Si, and Mg; and treating the melt in a high vacuum. Three requirements of good gaseous desulfurization are listed. Graphs and tables. 84 ref. (D1, CI)

65-D. (Italian.) **Factors Affecting the Formation of Surface Defects on Killed, Medium-Carbon Steel Ingots for Sheets.** Mario Signora and Guido Camolese. *La Metallurgia Italiana,* v. 44, Nov. 1952, p. 560-567.

A study was made on 2000 ingots. Effects of chemical composition, mold size and shape, pouring temperature, rising speed of the metal, type of pouring, and mold preparation. Photographs and charts. (D9, CN)

66-D. Metallurgy and Economics of Oxygen Enrichment When Refining Steel in the Converter. R. Graef. Henry Brutcher, Translation 2887, 20 pages.

Previously abstracted from *Stahl und Eisen.* See item 24-D, 1952. (D3, CN)

67-D. (French.) **Influence of the Rate of Operation of Iron and Steel Mills on Their Fuel Consumption.** M. Moinet. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 59, 4 pages.

General discussion. Graphs. (D general, ST)

68-D. (French.) **Comparison of Open-Hearth and Arc Furnaces for Production of Steel.** Boutigny and Barbazanges. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 121, 4 pages.

Includes tabular data. (D2, D5, ST)

69-D. (French.) **Properties and Utilization of Blast-Furnace Gas.** J. Szczeniowski. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 164, 8 pages.

Smoke-producing and burning powers, specific heats, and combustion temperatures. Graphs. (D1)

70-D. Melting Practice and Refractories Performance in Basic Electric-Arc Furnaces. M. P. Fedock. *Industrial Heating,* v. 20, Jan. 1953, p. 135-136, 138, 140.

Effect of different melting techniques for O_2-blown, high and low-carbon alloy steels, and stainless steel, on humidity in furnace atmosphere. (D5, AY, SS)

71-D. Factors Influencing Surface Quality of High Sulfur Steels. George G. Blean. *Iron and Steel Engineer,* v. 30, Jan. 1953, p. 79-81; disc., p. 82-83.

Mold conditioning, mold design, track time, heating, and rolling. Graphs. (D9, F21, F23, ST)

72-D. Assessment of Skin Thickness of Rimming Ingots. S. J. Smith. *Journal of the Iron and Steel Institute,* v. 173, Jan. 1953, p. 16-18.

By examination of a series of 60 steel ingots, it is shown that major factors governing skin thickness of rimming ingots seem to be teeming rate and rimming characteristics. Table and graphs. (D9, CN)

73-D. Accelerated Solidification in Ingots. Its Influence on Ingot Soundness. Edgar Marburg. *Journal of Metals,* v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 157-172.

Most ingots complete solidification vertically rather than transversely. Conclusion is based on complete solidification patterns of big-end-up and big-end-down carbon steel ingots developed from dumped and split ingots. New mechanisms for segregation in ingots are proposed. Internal soundness in ingots is found to depend upon adequate width of vertical core. Photographs and graphs. 14 ref. (D9, CN)

74-D. Reduction of Silicon From Blast Furnace Type Slags. James C. Fulton, Nicholas J. Grant, and John Chipman. *Journal of Metals,* v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 185-190.

Contains data on distribution of Si between liquid Fe-Si-C alloys saturated with respect to graphite and $CaO\text{-}SiO_2\text{-}Al_2O_3$ slags under 1 atm. of CO at 1600° C. Ranges of slag compositions studied were extended from dicalcium silicate saturated liquidus composition up to silica concentrations at which SiC appeared as a stable phase. Tables and graphs. 10 ref. (D1, Fe)

75-D. Progress in Steelmaking Processes in America. John S. Marsh. *Metal Progress,* v. 63, Jan. 1953, p. 74-77.

General discussion appraising standard steelmaking processes and possible future improvements. (D general, ST)

76-D. Postwar Progress and Trends in Steel Manufacture in the Benelux Region. Achille G. Lefebvre. *Metal Progress,* v. 63, Jan. 1953, p. 84-88.

Raw materials; plant rehabilitation; recent improvements in basic bessemer processes. (D3, ST)

77-D. (French.) **Desulfurization of Cast Iron and Dephosphorization of Basic Bessemer Steels by Soda Slags.** Francis Meunier. *Revue de Métallurgie,* v. 49, Dec. 1952, p. 855-861; disc., p. 861-862.

Experiments were made on ladle and converter treatments with various slags. Data are tabulated and charted. 13 ref. (D1, D3, CI, CN)

78-D. (French.) **New Process of Making High Quality, Killed Basic Bessemer Steel.** F. Meunier and R. Soisson. *Revue de Métallurgie,* v. 49, Dec. 1952, p. 876-882; disc., p. 882.

Process in which steel is transferred to a second converter at the end of the desulfurizing blow. Properties of four steels with C content from 0.05-0.48%. 13 ref. (D3, Q general, CN)

79-D. Australia's Largest Blast Furnace Completed at Australian Iron & Steel Ltd., Port Kembla. *Australasian Engineer,* Dec. 8, 1952, p. 43-47.

Describes and illustrates the furnace. (D1, Fe)

80-D. The Production of High Purity Iron by Direct Reduction From the Ore. Details of the Duffield Method of Smelting. J. E. Ferry. *Australasian Engineer,* Nov. 7, 1952, p. 70-73; Dec. 8, 1952, p. 48-52.

The Duffield Process for production of sponge Fe. Includes a heat balance table. (D8, Fe)

E

FOUNDRY

57-E. Measure Ferrous Metal Fluidity. F. C. Langenberg and R. D. Stout. *American Foundryman,* v. 23, Jan. 1953, p. 44-47.

Makes use of a permanent steel mold. (E25, Fe)

58-E. Cupola Melting and Control for Machine Tool Castings. A. J. Dublo. *American Foundryman,* v. 23, Jan. 1953, p. 53-57.

Techniques of Sterling Foundry Co. for obtaining high quality castings. (E10, CI)

59-E. Automatic Fume Collection Solves Air Pollution Problem. J. E. L'anson, T. L. Harsell, Jr., and R. T. Pring. *American Foundryman,* v. 23, Jan. 1953, p. 61-64.

Equipment installed by Lincoln Foundry Corp., Los Angeles, designed to reduce emissions from its cupola. Problems involved, equipment design, and results. Tables and schematic diagram. (E10, A5, CI)

60-E. Advantages and Limitations of Olivine Molding and Core Sand. Wm. A. Snyder. *American Foundryman,* v. 23, Jan. 1953, p. 65-68. (E18, CI)

61-E. On Steel Castings by the Shell Moulding Process. M. J. Sargeaunt. *British Steelmaker,* v. 19, Jan. 1953; p. 26-29.

The process and success with alloy steels. Advantages. (E16, AY)

62-E. Mechanized Shell-Moulding Process. *Engineering,* v. 175, Jan. 9, 1953, p. 44-45.

Briefly described and illustrated. (E16)

63-E. The Principles of Risering. Charles F. Walton. *Foundry,* v. 81,

Feb. 1953, p. 100-107, 244-245.
Four reasons for using risers, various riser systems, and errors encountered. Photographs. (E22)

64-E. A Cause of Surface Porosity in 7 Per Cent Silicon Aluminum Castings. Clinton F. Zabriskie. *Foundry*, v. 81, Feb. 1953, p. 112-113.
Brief discussion. Photographs and tables. (E25, Al)

65-E. Plaster Cores Formed in Plastic Corebox. Gilbert C. Close. *Foundry*, v. 81, Feb. 1953, p. 132, 134.
Cores used for casting Al alloy turbine impeller wheels. Photographs. (E21, Al)

66-E. Casting Design Improved by Welding. Arthur L. Phillips. *Foundry*, v. 81, Feb. 1953, p. 148, 151.
Advantages of casting smaller parts and welding them into the finished product.
(E general, K general)

67-E. Surface Finish and Facing Sands. Roy Pell. *Foundry Trade Journal*, v. 94, Jan. 1, 1953, p. 5-12.
Experiments to determine types and compositions of sands for Fe and gunmetal castings from a few ounces to 5 tons. Diagrams and photographs. (E18, CI, Cu)

68-E. Fettling of Mass-Production Castings. R. P. Henricks. *Foundry Trade Journal*, v. 94, Jan. 1, 1953, p. 13-17.
Uses of various fettling equipment. How appearance of the casting may be improved by modern practice. (E10, CI)

69-E. Core-Assembly as a Production Aid to the Jobbing Founder. E. H. Beech and J. Hoyes. *Foundry Trade Journal*, v. 94, Jan. 8, 1953, p. 33-39; Jan. 15, 1953, p. 71-78.
Foundry layout, typical castings, labor, planning of core-assembly, packing blocks, and gear-case casting. Second part: Block-pattern condenser shell, suppression of dust, exhaust casing, and compressor half-casing. Photographs. (E11)

70-E. Solidification Rate of Cast Iron. *Foundry Trade Journal*, v. 94, Jan. 15, 1953, p. 59-62.
Method in which thermocouples are placed in selected positions in the mold cavity or in the sand to record temperature changes from moment of pouring metal into mold until solidification occurs.
(E23, S16, CI)

71-E. Principles of Gating. Review and Bibliography of Previous Investigations. G. Martin. *Foundry Trade Journal*, v. 94, Jan. 15, 1953, p. 63-69.
General discussion of turbulence effects and flow through a gating system. 58 ref. (E22)

72-E. Where Shell Mold Castings Stand Today. Kenneth Rose. *Materials & Methods*, v. 37, Jan. 1953, p. 73-77.
Specific cost figures and an appraisal of properties of castings produced by the Croning or "C" process. Photographs show castings of gray iron, Al, bronze, stainless steel, Mg, Ni-Ag, malleable iron and Mg-bronze. (E16, CI, Al, Cu, SS, Mg)

73-E. How to Buy Aluminum Castings. Floyd A. Lewis. *Materials & Methods*, v. 37, Jan. 1953, p. 95-100.
Selection rests on consideration of engineering properties, cost, design possibilities, and production rates obtainable with sand, permanent mold, or die casting. Photographs and tables.
(E11, E12, E13, Al)

74-E. Mechanical Metal-Charging. H. K. Barton. *Metal Industry*, v. 82, Jan. 2, 1953, p. 7-8.
Automatic lading in cold chamber die-casting machines. (E13, Al)

75-E. Die-Castings in the Dictaphone Time-Master. *Metal Industry*, v. 82, Jan. 9, 1953, p. 26-29.
Parts cast from Zn-base, Al-base, and Mg-base alloys.
(E13, T10, Zn, Al, Mg)

76-E. Porous Gunmetal Bush. *Metal Industry*, v. 82, Jan. 9, 1953, p. 31-32.
Investigation which indicated that sand conditions may result in poor castings. (E11, Cu)

77-E. Control Keynotes Unusual Foundry. Gordon B. Ashmead. *Western Machinery and Steel World*, v. 44, Jan. 1953, p. 68-71, 97.
Precision in casting hard-to-cast objects from Meehanite iron. Photographs. (E11, CI)

78-E. (Dutch.) **The Effect of Baking Time and Temperature on the Properties of Oil-Sand Cores.** A. J. Zuithoff and W. van Stam. *Metalen*, v. 7, Nov. 30, 1952, p. 401-407.
Importance of time and temperature control in order to obtain optimum properties. Testing equipment and charted data. (E21)

79-E. (French.) **Precision Casting With the Lost Wax Process, and Its Application to the Casting of Small Pieces of Steel and Refractory Alloys.** E. Morlet. *Métaux Corrosion—Industries*, v. 27, Oct. 1952, p. 401-413.
Details of the process, such as manufacture of wax forms, casting, finishing, and modifications for specific materials. Diagrams and photographs. (E15, SS)

80-E. (German.) **On Measuring the Gas Content of Cores.** F. Roll. *Giesserei*, v. 39, Nov. 13, 1952, p. 603-606.
Four methods and the equipment. Test data are tabulated and charted. (E18)

81-E. (German.) **Causes and Ways of Minimizing Casting Flaws in Zinc Pressure Die Castings.** F. Richter. *Giesserei*, v. 39, Nov. 27, 1952, p. 625-630.
Microporosity of castings; behavior of plated coatings; ways of eliminating flaws; and additional uses for plated scrap. Photographs. (E13, Zn)

82-E. (German.) **Casting Under Extreme Conditions.** E. Schmid. *Metall*, v. 6, Dec. 1952, p. 737-744.
Vacuum casting, casting under pressure, extremely rapid and extremely slow solidifiction, and the significance of mechanical vibrations during solidification. Charts and diagrams. 35 ref. (E25)

83-E. (Swedish.) **Aspects of the Design of Pneumatic Molding Machines.** J. Broberg and L. Villner. *Gjuteriet*, v. 42, Nov. 1952, p. 175-178, 179-184, 185-188, 189-191.
Numerous points which should be considered. Photographs and drawings. (E19)

84-E. (Swedish.) **A Swedish Automatic Molding Machine.** R. Orban. *Gjuteriet*, v. 42, Dec. 1952, p. 199-202.
A fully automatic machine. Time for separate operations can be adjusted and it can be operated semi-automatically. (E19)

85-E. Contribution to Ingot-Mold Making. E. Feil. Henry Brutcher, Translation 2894, 18 pages.
Previously abstracted from *Die Giesserei*. See item 583-E, 1951.
(E12, CI)

86-E. Impregnation Salvages Porous Castings. *Canadian Metals*, v. 16, Jan. 1953, p. 34-35.
Use of resins for impregnating ferrous and nonferrous metals.
(E25, Fe, EG-a)

87-E. (French.) **The Rational Utilization of Coke for Heating of Foundry Ovens.** M. G. Ulmer. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 44, 10 pages.
Experimental oven, and results of experiments on the operation of the coke furnace. Diagrams, charts, and photographs. (E10)

88-E. (French.) **Developments of Induction Heating at Intermediate Frequencies for the Foundry and Through Heatings.** J. Minssieux. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 109, 8 pages.
General discussion on induction heating plus notes on choice of frequency, as well as some operating characteristics of induction melting furnaces. Different types of generators for furnaces and heat treatment apparatus, as well as installations for forging. Photographs.
(E10, F21, J2, ST, Cu, Ni)

89-E. (French.) **High-Frequency Driers. Description of Modern Driers.** Marc F. Degros. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 201, 6 pages.
Some applications of dielectric drying in food production, textile industry, and the foundry. (E21)

90-E. (French.) **"Philipon" Hot-Air Cupola-Gas Generator.** M. Boutigny and H. Philipon. *Fourth International Congress on Industrial Heating* (Paris), No. 206, 3 pages.
Advantages over cold-air cupola-gas generator. Schematic diagram of apparatus. (E10)

91-E. Feeding Heads. I and II. M. R. Hinchcliffe. *Metal Industry*, v. 82, Jan. 16, 1953, p. 43-46; Jan. 23, 1953, p. 67-70.
Application of "Feedex" in conjunction with a neckdown technique for feeding heads. Principles and details of process. Graphs, tables, and diagrams. 11 ref. (E22)

92-E. Foundry Facilities Molded to Production. *Steel*, v. 132, Feb. 2, 1953, p. 102-103.
Use of squeezer machines and other innovations for increasing production and lowering costs of iron and bronze castings. Photographs. (E11, CI, Cu)

93-E. Ultrasonic Vibrations and Their Metallurgical Applications. K. F. Alder. *Australasian Engineer*, Dec. 8, 1952, p. 53-59.
Methods of generating ultrasonic vibrations, particular emphasis being placed on phenomenon of magnetostriction and its application in ultrasonic transducers. Review of metallurgical applications of high-frequency vibration is given, with attention concentrated on grain refinement of castings. 28 ref.
(E25, P10, P16)

94-E. Modification of Aluminium-Silicon Alloys. R. H. Dyke. *Foundry Trade Journal*, v. 94, Jan. 22, 1953, p. 91-96.
Mechanism, investigation of modification by NaCl/F flux, modification with low-melting-point ternary flux, and modification using Na metal. Photographs and micrographs. 24 ref. (E25, Al)

95-E. Shell-Moulding and the Plastics Industry. *Foundry Trade Journal*, v. 94, Jan. 22, 1953, p. 97.
Describes use of plastics in the foundry. (E19)

96-E. Foundry Sand Control. Special Application to Synthetic Sand Practice. A. Tipper. *Foundry Trade Journal*, v. 94, Jan. 22, 1953, p. 99-101.
Characteristics of molding sands which are of particular importance to foundrymen in producing good molds and castings. Reviews methods used for routine sand control, investigates sand properties, and possible causes and cures for certain sand troubles. (E18)

97-E. Non-Ferrous Foundry Transferred. Developments at George Kent, Limited. *Foundry Trade Journal*, v. 94, Jan. 22, 1953, p. 103-105.
New location and layout of above plant. (E general, A5, EG-a)

98-E. Designing an Ideal Sand Casting. T. H. Trevithick. *Product Engineering*, v. 24, Feb. 1953, p. 168-170.
Review of factors that make a casting ideal from a production as well as a functional viewpoint. Diagrams. (E11)

99-E. (Pamphlet.) **The Application of Shell Molding to the Production of Magnesium Castings.** Office of Tech-

nical Services, U. S. Department of Commerce, Washington 25, D. C., PB111049, Feb. 10, 1953. $.75.

Description of practical application of principles evolved for shell molding Mg, and a discussion of metallurgical properties of resulting castings. (E16, Mg)

F

PRIMARY MECHANICAL WORKING

62-F. Rolls and Rolling. Part XXXIII. Rails. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 41, Jan. 1953, p. 69-74.

Pass design standardization. Roll designs. (F23)

63-F. Brazed, Welded Tubing Coated for Corrosion Protection. Herbert Chase. *Iron Age,* v. 171, Jan. 29, 1953, p. 118-119.

Brazed and welded ferrous tubing, fortified with Cu, Sn, or Pb coatings for corrosion protection, is rapidly produced on a continuous basis at Rochester Products Div. of General Motors Corp., Rochester, N. Y. Starting as ribbons of steel, tubing is formed, brazed or welded, either dipped or electric plated, tested and coiled or cut to length. (F26, Fe, Cu, Sn, Pb)

64-F. Looping Rod Mill. Parts I, II, III, and IV. John H. Mort. *Metal Industry,* v. 81, Dec. 5, 1952, p. 445-447; Dec. 12, 1952, p. 461-462; Dec. 19, 1952, p. 481-483, Dec. 26, 1952, p. 501-504. (Concluded.)

Mill for drawing Cu wire. Raw material, finished products, and rolling techniques. Part II is a theoretical discussion on compiling a draft schedule. Parts III and IV present a theoretical analysis of loop forming. Diagrams and tables. (F27, F28, Cu)

65-F. Drop Hammer Forming Magnesium Sheet. F. L. Coenen. *Modern Metals,* v. 8, Jan. 1953, p. 33-34, 36-37.

Good results can be obtained in producing Mg parts in drop hammer if certain technical precautions and practices are observed. Recommendations of an engineer who has conducted considerable work on the process. (F22, Mg)

66-F. Manufacturing Rail Wheels. *Overseas Engineer,* v. 26, Jan. 1953, p. 203-204.

Procedure at Steel, Peech and Tozer works at Ickles for forging rail wheels from mild carbon, and alloy steel. (F22, CN, AY)

67-F. A Graphical Analysis of Power Consumption in Continuous Cold Reduction Mills. J. H. Mort. *Sheet Metal Industries,* v. 30, Jan. 1953, p. 57-72.

Theoretical discussion. Graphs and tables. (F23, CN)

68-F. Better Lubrication Boosts Production. A. D. Binz. *Steel,* v. 132, Jan. 26, 1953, p. 88, 90, 92.

Advantages of using Li base grease in hot strip mill. (F1)

69-F. (German.) **Flame Treating Ingots With Oxygen.** Egon Ritter and Heinz Didier. *Schweissen und Schneiden,* v. 4, Oct. 1952, p. 364-370.

Development and spread of the process; differences between acetylene cutting and flame treating; manipulation and procedure for use of the hand flame-treating apparatus; treating individual defects; oxygen pressure and use; fuel gas pressure and use; zone of heat influence, practicability; and flame treating in American installations. Photographs and ref. (F21, ST)

70-F. (French.) **High-Speed Gas Heating of Metallurgical Products.** M. Regis. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 161, 8 pages.

Recent developments in high-speed gas heating and its application in the heating of bars, tubes, strip, and billets. Graphs and diagrams. (F21)

71-F. (French.) **Some Considerations on Rolling Mill Pusher-Type Furnaces.** C. Calmes. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 183, 6 pages.

Operation and construction of the furnace. Method of detecting defects in order to reduce the useless consumption of heat. Graphs. (F21, F23)

72-F. The Extrusion of Steel. Equipment, Operation, Production. Jacques Séjournet. *Iron and Steel Engineer,* v. 30, Jan. 1953, p. 73-77; disc., p. 77-78.

Underlying principles of successful extrusion of steel, novel means now in use, and some possible future departures from present practices. Diagrams. (F24, ST)

73-F. Operation and Roll Design of the Gary Rail Mill. R. W. Dickson. *Iron and Steel Engineer,* v. 30, Jan. 1953, p. 93-99; disc., p. 99-101.

Equipment, layout, and procedure for rolling rails. (F23, CN)

74-F. Functioning of a Lubrication Organization in Heavy Rolling Mills. Robert R. Taylor. *Iron and Steel Engineer,* v. 30, Jan. 1953, p. 107-110; disc., p. 110-112.

Need and value of a well-organized lubrication organization in steel industry; emphasizes that this lubrication organization must function properly to be of value. (F23, CN)

75-F. The Drawing of Steel Wire at Elevated and Sub-Normal Temperatures. F. C. Thompson, J. B. Carroll, and E. Bevitt. *Journal of the Iron and Steel Institute,* v. 173; Jan. 1953, p. 36-51.

Hot drawing of mild steel wire and drawing at subnormal temperatures. Diagrams, graphs, and tables. 10 ref. (F28, CN)

76-F. Rehabilitation of a Slab Mill Without Loss in Production Time. A. Taylor. *Journal of the Iron and Steel Institute,* v. 173, Jan. 1953, p. 69-80.

Work consisted of electrification of the mill drive, installation of a new 50-ton overhead crane, conversion of a universal edge mill to a slab mill; and installation of much auxiliary plant, including ingot chair, ingoing and working tables, manipulating shears, outgoing run-out, crop handling arrangement, and mobile transfer table. Electrical equipment and civil engineering work involved in preparing new foundations. Diagrams. (F23)

77-F. Improved Manufacture of Large Alloy Steel Forgings. H. H. Burton. *Metal Progress,* v. 63, Jan. 1953, p. 125-129.

New steel compositions, ingot stage, forging practice, and heat treatment. Forgings described are made from 3% Cr-Mo steel. Tables and micrographs. (F22, AY)

78-F. Powerful Giant Will Reduce 18-Inch Tubes. Graham B. Brown. *Steel,* v. 132, Feb. 9, 1953, p. 90-91.

Machine which produces largest light-wall seamless tubing by cold reducing method. (F26)

79-F. Thompson Forging Operations Employ Induction Heating for Operating Economy. Paul Miller. *Western Metals,* v. 11, Jan. 1953, p. 58-60.

Results in closer controlled heating, more uniformity of parts being forged, and longer die life coupled with over-all operating economy and speed of production for forging operations of engine valves, bolts, and steel alloy rings for automotive and aircraft parts. Photographs. (F21, F22, ST)

80-F. Permanent Magnetic Properties in 18-8 Obtained by Cold Working. Samuel Storchheim. *Iron Age,* v. 171, Feb. 12, 1953, p. 140-142.

Cold reduction of annealed types 302 and 304 stainless steel wires which causes the austenitic matrix to transform to martensite. Wires, initially nonmagnetic, change partially to a ferromagnetic condition. Tables. (F28, P16, SS)

81-F. The Cold Reduction of Silicon-Steel and Stainless-Steel Strip. Alastair McLeod. *Sheet Metal Industries,* v. 30, Feb. 1953, p. 93-104.

Use of a 4-high reversing mill and up-to-date pickling line which includes a sodium-hydride bath for descaling stainless steel, and electric resistance decarburizing furnaces. Photographs. (F23, L12, AY, SS)

82-F. (Pamphlet.) **The Manufacture of Titanium Alloys.** Robert H. Dickinson and G. William Bauer. P. R. Mallory & Co., Inc. (Indiana), Report No. 6, Progress Report for June and July, 1951, Memo No. 8000-M-484, Aug. 3, 1951, 15 pages.

Forged properties, fabrication, and physical properties of Ti alloy. Micrographs and tables. (F22, Q general, Ti)

G

SECONDARY MECHANICAL WORKING

62-G. Machinability Studies Compare Cast and Wrought Steels. *Iron Age,* v. 171, Jan. 1953, p. 102-104.

Tool life was used to measure machinability of seven cast steels prepared in 18 different heat treatments for turning. Comparison of 4130 Cr-Mo cast steel and 4140 wrought steel. Graphs. (G17, AY)

63-G. Impact Forming of Sheet Metal. *Modern Industrial Press,* v. 15, Jan. 1953, p. 24, 26, 28.

General discussion which includes steel, cast iron, stainless steel, and Zn dies for forming Al, stainless steel and Zn parts. Photographs. (G1, ST, CI, SS, Zn, Al)

64-G. New Press-Forming Techniques. John Starr. *Modern Industrial Press,* v. 15, Jan. 1953, p. 42, 44, 46.

Operation of stretch presses at North American Aviation, Inc., Los Angeles. (G9)

65-G. Cold Forming Titanium. J. W. Gulliksen. *Modern Metals,* v. 8, Jan. 1953, p. 48, 52.

Multi-stage drawing, light gage work, and forming rectangular and round parts. (G4, Ti)

66-G. Flame Beats Sugar for Lengthening Die Life. Joseph A. Goodbar. *American Machinist,* v. 97, Feb. 2, 1953, p. 122-123.

How high-silicon electrical grade steel is heated to reduce die wear in making motor laminations. Photographs. (G1, AY)

67-G. Metals Sawed by Friction. M. A. Bergson. *Aviation Age,* v. 19, Feb. 1953, p. 56-63.

Band sawing technique for cutting ferrous metals, by utilizing heat produced by friction. (G17, Fe)

68-G. Diminution of Plastic-Deformation Zone in the Machining of Metals Under the Action of Surface-Active Liquids. G. I. Epifanov and L. A. Shreiner. Henry Brutcher, Translation 2910, 5 pages.

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 171-G, 1952. (G17, Q24, Al)

69-G. Effectiveness of Liquid Media in the Cutting of Metals as Function of Physico-Chemical Nature of

Medium and Metal. N. A. Pleteneva and G. I. Epifanov. Henry Brutcher, Translation 2935, 7 pages, v. 77, 1951, p. 1051-1053.

Previously abstracted from *Doklady Akademii Nauk SSSR.* See item 390-G, 1951. (G21)

70-G. Fabricating Integral Finned Tubing. *Canadian Metals,* v. 16, Jan. 1953, p. 44-45.

Fabrication of Cu, Cu-base alloys, and Al tubing by cold roll-forming process. (G11, Cu, Al)

71-G. New Grinding Technique Speeds Extruded Tube Production. *Canadian Metals,* v. 16, Jan. 1953, p. 46-47.

Technique employing two coated abrasive belts on a new centerless grinder is claimed to make possible a grinding rate of cylindrical stock faster than any other method of precision grinding. Developed for grinding stainless steel and other high-alloy tubes. (G19, SS)

72-G. Die Plate Calculation. Federico Strasser. *Modern Machine Shop,* v. 25, Feb. 1953, p. 174-176, 178.

Three steps, including formulas. Tables and diagrams. (G1, TS)

73-G. Cutting Fluid Reconditioning. *Screw Machine Engineering,* v. 14, Feb. 1953, p. 35-38.

Shown to be an important step in fluid conservation, tool life, and better part finishes. Photographs. (G21)

74-G. Speeds & Feeds for Counterboring Steel. *Screw Machine Engineering,* v. 14, Feb. 1953, p. 49-52.

Tabulated information and rules for calculating cutting speeds. (G17, ST)

75-G. Press Works in Two Directions. *Steel,* v. 132, Feb. 2, 1953, p. 122-124, 126.

Press which utilizes a horizontal ram working at both ends of the stroke, thus eliminating idle return. (G4)

76-G. Cutting Speed. Horizons Limited. Hans Ernst. *Steel,* v. 132, Feb. 9, 1953, p. 88-89.

Mathematical means for computing costs of cutting operations. (G17)

77-G. Gears Cut by Guided Flame. R. E. Orton. *Tool Engineer,* v. 30, Feb. 1953, p. 37-44.

Cutting of steel gears made possible by supplanting hand-guided torch with machine guiding wherein torches automatically trace out a faithful and accurate reproduction of a metal template. Photographs and diagrams. (G22, ST)

78-G. The Machinability of Cast Steels. Norman Zlatin, John F. Kahles, and Charles W. Briggs. *Tool Engineer,* v. 30, Feb. 1953, p. 59-67.

Steel microstructure, hardness, and tensile strength as related to tool life and power requirements. Covers carbon cast steel and several alloys including medium Mn, Cr-Mo, Ni-Cr-Mo, and Mn-Mo cast steel. (G17, CI)

79-G. Metallurgical Aspects of Machinability of Steel. Part II. (Concluded.) W. I. Pumphrey. *Welder,* v. 21, Oct.-Dec. 1952, p. 85-90.

Effect of chemical composition, heat treatment, metallographic structure, and mechanical properties. (G17, ST)

80-G. High-Zinc Brasses. *Copper & Brass Bulletin,* Feb. 1953, p. 8-9.

General discussion on brasses. Includes table of forming properties. (G general, Cu)

81-G. Convert to Belts for Lower Polishing Costs. J. J. Durnan. *Iron Age,* v. 171, Feb. 12, 1953, p. 133-135.

Conversion of polishing lathes from setup wheels to belt grinding by making use of backstand idlers. This gives every shop advantage of cooler, faster grinding at lower cost per piece. (G18, L10)

82-G. Titanium Can Be Deep Drawn. J. W. Gulliksen. *Iron Age,* v. 171, Feb. 12, 1953, p. 136-139.

Process of Worcester Pressed Steel Co. using tools designed for deep drawing steel cup-shaped parts. Reductions as high as 38% were obtained on 0.078-in. sheet in one draw. (G4, Ti)

83-G. Bending Aluminium Beams. *Metal Industry,* v. 82, Jan. 30, 1953, p. 86.

Machine developed for fabrication of aircraft structures. Photographs. (G6, Al)

84-G. Extrusion With Glass Lubrication. H. W. Perry. *Metal Industry,* v. 82, Jan. 30, 1953, p. 87-88.

Briefly describes use of glass as a die lubricant, a process primarily to assist drawing and forming of steel sections. Photographs. (G21)

85-G. Unusual Aircraft Components Produced by Stretch-Forming. T. A. Dickinson. *Sheet Metal Industries,* v. 30, Feb. 1953, p. 115-118.

Using new-type accessories and operational procedures made it possible to fabricate many unusual metal parts by means of stretch presses. Photographs and diagrams. (G9)

86-G. Right Wheel Cuts Diamond Consumption. John W. Ripple. *Steel,* v. 132, Feb. 16, 1953, p. 72-73.

Chipbreaker grinding in carbide cutter tips is an operation where wheel life is important. Width of wheel, coolant, and feeds have effect on life. Diagrams. (G18, C-n)

87-G. (Book.) General Metals. John L. Feirer. 257 pages. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N Y. $3.00.

Designed as a text in the field of metalworking for a modern industrial-arts program for junior or senior high school students. Some 22 to 45 pages each are devoted to such phases as wrought iron working, sheet metal, art metal and jewelry, and machine shop. Forging, heat treating, foundry and welding receive only 5 to 11 pages. (F general, G general)

88-G. (Book—French.) Metal Drawing. Rules, Calculation. B. Wassilieff. 76 pages. Dunod, 92 Rue Bonaparte, Paris 6, France. $1.25.

Principle of drawing, punch and die clearance and radii, lubrication, speeds, pressures, blank layout, and reductions in diameter. Practical examples of cylindrical, conical, hemispherical, and rectangular draws, together with methods of calculating necessary pressures and press sizes. (G4)

89-G. (Book—German.) (Hardmetal Cutting Tools.) Die Hartmetallwerkzeuge in der spanabhebenden Formung. J. Witthoff. 223 pages. Carl Hanser Verlag. Munich 27, Germany. 16 DM.

Use of sintered hard metal tools to cut ferrous metals, hard Mn steel, hard chill mold castings, weld deposits, Cu alloys, light metal alloys, plastics, glass, and wood. Machining of railroad wheels, milling gear wheels, drilling deep holes, and cutting threads. Indicates numerous ways of reducing production costs. (G17, Fe, Mn, Cu, Al, Mg)

90-G. (Book—German.) (Thread Rolling. Cold Forming of Precision Threads and Spindles.) Gewindewalzen Kaltverformung von Präzisionsgewinden und Spindeln. Heinz Apel. 355 pages. Carl Hanser Verlag, Munich 27, Germany. 24.80 DM.

Mathematical principles involved, and effect of temperature of materials to be rolled. Critically discusses foreign design as well as economy of thread cutting by this method. (G12)

H

POWDER METALLURGY

10-H. Technology of Titanium. H. W. Worner. *Australasian Institute of Mining and Metallurgy, Proceedings,* New Series, No. 158-9, 1950, p. 89-104.

Consolidation of powdered or spongy Ti, plus brief description of mechanical working, annealing, joining and other techniques. (H general, G general, J23, K general, Ti)

11-H. Aluminum in Powder Metallurgy. A. von Zeerleder. *Modern Metals,* v. 8, Jan. 1953, p. 40, 42, 44.

Two methods of preparing Al powder, mechanical properties, and applications. Micrographs and graphs. (H10, H11, T general, Al)

12-H. Powdered Magnetic Cores. W. J. Polydoroff. *Tele-Tech,* v. 12, Feb. 1953, p. 69-71, 112, 114, 116, 118, 120, 128, 131-132.

Measurement techniques for magnetic materials aid research and improve manufacturing methods. Factors affecting loss and permeability are analyzed. Graphs. 15 ref. (H11, SG-n, p)

13-H. (French.) Chemical Properties of Titanium-Aluminum Alloys. Jean Cueilleron and Claude Pascaud. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences,* v. 235, Nov. 17, 1952, p. 1220-1221.

Chemical methods for separating $TiAl_3$ from alloys with less than 53% Ti, and for selective attack of Al in alloys with 53-65% Ti thus producing Ti powder. (H10, Ti)

14-H. (German.) Surface Activity and Sintering of Fine Powders. Josef Hinnüber and Otto Rüdiger. *Archiv fur das Eisenhuttenwesen,* v. 23, Nov.-Dec. 1952, p. 475-482.

Electron microscope, X-ray, electron emission, oxidation and gas evolution studies were made on four W powders. Previous data on recrystallization of WC nuclei are refuted. Data are tabulated and charted. 18 ref. (H11, W)

15-H. (German.) On the Shrinkage of Powders of Nonthermoplastic Metallic Substances. Walther Dawihl. *Archiv fur das Eisenhuttenwesen,* v. 23, Nov.-Dec. 1952, p. 483-488.

Lists all regularities determined thus far on "liquid flow" or slip shrinkage. The concept of shrinkage, speed of shrinkage, influence of additions, and importance of the surface tension of added substances. 24 ref. (H11)

16-H. (German.) Preparation of Powdered Alloys at Low Temperature and Their Investigation on the Basis of Lattice Disturbances of the Thermal Fluctuation Type. F. Hund. *Zeitschrift fur Elektrochemie Berichte der Bunsengesellschaft fur Physicalische Chemie,* v. 56, No. 7, 1952, p. 609-612.

The metals or alloys were made from pure Fe and Ni oxalate and mixed oxalates of both metals by decomposition in N_2 and reduction in H_2 at 350 or 500° C. Lattice constants were determined by asymmetric method. Irregular lattice disturbances of the γ phase were determined and compared with temperature disturbances caused by thermal movement. 12 ref. (H10, M26, Ni, Fe)

17-H. Preforming Complex Carbide Shapes Lowers Costs. F. J. Lennon, Jr. *Iron Age,* v. 171, Feb. 5, 1953, p. 153-155.

Forming and shaping carbide tools can be done economically and quickly before final sintering, since the pieces are in a soft, chalk-like state. Photographs. (H14, C-n)

18-H. Magnetic Powder Cores. D. F. W. Champion and E. G. Wilkins. *Wireless World,* v. 59, Feb. 1953, p. 83-86.

Method of preparing magnetic powder, insulation, and core fabrication. (H10, T1, Fe)

19-H. (Book.) **Tablet Making.** Arthur Little and K. A. Mitchell. 123 pages. 1952. Northern Publishing Co., Ltd., 37, Victoria St., Liverpool 1, England. 15/-net.

Comprehensive description of all processes in tablet making, including mixing, granulating, drying, compressing, coloring, and coating, for all types of tablets, including powder metal compacts, together with details of plant and equipment. (H14)

J

HEAT TREATMENT

38-J. Ryan "Puts the Heat On" Unwanted Stresses. *Aviation Age,* v. 19, Jan. 1953, p. 70-75.

Installation of four furnaces at Ryan Aeronautical Co. of San Diego to stress-relieve Ryan afterburners, rocket motors, aft frames, and other jet components. (J1)

39-J. The Annealing of Steel. J. Lomas. *British Steelmaker,* v. 19, Jan. 1953, p. 30-33, 35.

Examination of principles and efficient practice. Temperature ranges, avoidance of surface oxidation, improved ductility, cooling outside the furnace, case hardening steels, and salt bath annealing. (J23, ST)

40-J. How Ohio Heat Treating Co. Hardens Tools in Controlled Gas Atmospheres. C. W. Stevens. *Industrial Gas,* v. 31, Jan. 1953, p. 7-9, 28.

Basic description of controlled atmospheres and why they are necessary in many operations. Carbon control and muffle-type furnace for heating steel. Photographs. (J2, ST)

41-J. Many Common Metals Successfully Treated in Steam Atmospheres. F. L. Spangler. *Materials & Methods,* v. 37, Jan. 1953, p. 84-86.

Method makes possible scale-free tempering, annealing, and stress relieving. Steel, cast iron, sintered powdered iron compacts, brass, bronze, and Al parts were successfully treated. Photographs. (J2, ST, CI, Cu, Al)

42-J. Distortion. It Can be Minimized in Heat Treating. A. L. Pranses. *Steel,* v. 132, Jan. 26, 1953, p. 70-72.

Extensive study was made of heat treating distortion encountered in manufacture of molds for industrial plastics. Molds were made from SAE 3335 steel modified by addition of 0.20% Mo to make it air hardening. Tables and graphs. (J26, AY)

43-J. Metallurgical Effects of Oxygen Cutting Alloy Steel (Armor Plate). F. C. Saacke. *Welding Journal,* v. 32, Jan. 1953, p. 19-30.

Hardenability of armor plate due to O_2 cutting, physical characteristics of cut edges and residual stresses resulting from cutting operation. Graphs, tables, micro- and macrographs. (J26, Q25, G22, AY)

44-J. Flame Hardening of Large Diameter Thin-Wall Cylindrical Shells. Gustave A. Weber. *Welding Journal,* v. 32, Jan. 1953, p. 37-43.

Adoption of flame hardening process to progressively "through harden" thin-walled cylinders with minimum distortion with equipment now in use. (J2)

45-J. Strip Annealing Is High-Speed, Continuous in Direct-Fired Radiant-Gas Mill Equipment. Charles A. Turner, Jr. *American Gas Journal,* v. 178, Jan. 1953, p. 16-19.

Advantages of this method in producing tinplate. (J23, CN)

46-J. Effect of Heat Treatment and Related Factors on Straight-Chromium Stainless Steels. *Corrosion,* v. 9, Feb. 1953, p. 56-65.

General relationship between structural changes caused by heat treatment and hardness, toughness and corrosion resistance; specific data are given for each grade. Graphs and tables. (J general, Q29, R general, SS)

47-J. (French.) **Importance of Heat Treatment in the Creep Resistance of Steel.** G. Delbart and M. Ravery. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 92, 6 pages.

Studies using a Cr-Mo steel. Temperature influence, 1000-hr. tests, and influence of lengthy preheating on high-carbon Cr-Mo steels. Tables and charts. (J general, Q3, AY)

48-J. (French.) **Electrical Heating of Furnaces With Controlled Atmosphere.** R. Henrion. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 106, 6 pages.

Metallic muffle furnaces, furnaces with tight outer shells, and the advantages of electric heating for temperatures above 800° C. Photographs. (J2)

49-J. (French.) **Conditions for Using the Oxy-Acetylene Flame in Surface Hardening.** Marcel Vilez. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 123, 7 pages.

Discusses, in particular, instantaneous general hardening. Graphs. (J2)

50-J. (French.) **Furnacés for Isothermal Treatment and for Quenching of Successive Stages.** G. E. Stempfel. *Fourth International Congress on Industrial Heating* (Paris), No. 207, 5 pages.

Furnaces for temperatures less than 250° C., furnaces for bath quenching, quenching of high speed steels by successive stages, and isothermal annealing between 650 and 700° C. (J26, TS)

51-J. Continuous Heat Treatment Process Produces High Strength Oil Well Casing. F. H. Bremmer and F. J. Zehnder. *Iron and Steel Engineer,* v. 30, Jan. 1953, p. 55-62; disc., p. 62-64.

Production method of manufacturing high strength quenched and tempered oil-well casing from plain carbon steel. (J26, CN)

52-J. Thermal Stabilization of Austenite in Carburizing Steels. H. M. Otte and T. Ko. *Journal of the Iron and Steel Institute,* v. 173, Jan. 1953, p. 31-35.

Study made of retained austenite in two carburized steels. Graphs. 19 ref. (J23, AY)

53-J. Transformation Characteristics of 3 Pct Al-5 Pct Cr Titanium Alloy. Lee S. Busch. *Journal of Metals,* v. 5, sec. 1, Feb. 1953, p. 146-149.

Investigation to determine effects of isothermal heat treatment on physical properties in tension, microstructure, machinability, and weldability. Micrographs and graphs. (J26, N8, Q general, Ti)

54-J. Practical Metallurgy, "Down-Under". Arthur S. Reardon. *Metal Progress,* v. 63, Jan. 1953, p. 99-102.

Postwar heat treating equipment and techniques in Australia. (J general, TS)

55-J. Hardenability Bands for Tentative Standards. *Metal Progress,* v. 63, Jan. 1953, p. 114-B.

Data sheet. (J26, AY)

56-J. Carbonitriding. D. M. Dovey and K. C. Randle. *Metal Treatment and Drop Forging,* v. 19, Dec. 1952, p. 511-518; v. 20, Jan. 1953, p. 11-14.

Principles of salt-bath cyaniding, gas carbonitriding, effect of gas composition, time, temperature, and heat treatment of carbonitrided cases. Part II: Technique of carbonitriding and suitable atmospheres, and types of generators available. Some furnaces designed for carbonitriding. Graphs, tables, and micrographs. 7 ref. (J28, ST)

57-J. Induction Fixture Permits Selective Surface Hardening. J. F. Libsch. *Metal-Working,* v. 9, Feb. 1953, p. 6-7.

A new, rapid and efficient method. Photographs and graphs. (J2, CN)

58-J. (Pamphlet.) **Nitriding and Carbonitriding of Titanium Metal and Its Alloys.** Edmond J. Silk. Sam Tour & Co., Inc., (New York City), P#2282, R# 9459, Copy No. 41, May 12, 1952, 21 pages.

Describes equipment used for nitriding experiments on Ti and its alloys. Results of experiments on RC-55 ductile Ti and several higher strength alloys. Graphs and micrographs. (J28, Ti)

K

JOINING

112-K. Resistance Welding. *Aero Digest,* v. 66, Jan. 1953, p. 42.

Welding Al aircraft parts. (K3, Al)

113-K. Frequency Changer for Resistance Welding. M. E. Bivens. *Electronics,* v. 26, Feb. 1953, p. 108-114.

Direct conversion from 3-phase 60-cycle power to single-phase low-frequency power improves power factor and reduces kva demand and line drop, compared to more commonly used 60-cycle single-phase machines. Circuit diagrams. (K3)

114-K. Welded Jet Engine Parts Cut Weight, Increase Power. *Iron Age,* v. 171, Jan. 22, 1953, p. 110-112.

Extended abstract of "Shielded Arc Welding of Jet Engine Components", by K. H. Koopman presented at 33rd annual meeting of AWS. Tabulates information concerning composition, jet engine components, and recommended welding rod for wrought modified austenitic stainless steels, wrought specialized alloys, and cast special alloys. Combinations of dissimilar metals and recommended welding rods are given. (K1, AY, SS)

115-K. Experiments on the Properties and Uses of Heat-Resisting Ferritic-Austenitic Arc-Welding Electrodes. J. P. Kienberger. *Sheet Metal Industries,* v. 30, Jan. 1953, p. 23-43, 72.

Comprehensive discussion. Tables and graphs. 37 ref. (K1, T5, SS)

116-K. Spot Welding of Magnesium With Three-Phase Low Frequency Equipment. Paul Klain, D. L. Knight, and J. P. Thorne. *Welding Journal,* v. 32, Jan. 1953, p. 7-18.

Use of single or dual force system, with or without postheat. Tables, graphs, macrographs, and radiographs. (K3, Mg)

117-K. Inert Arc Welding of 90-10 Cupro-Nickel. Lowell H. Hawthorne. *Welding Journal,* v. 32, Jan. 1953, p. 31-36.

Development of filler metal and the welding procedures for producing sound, satisfactory welds in 90-10 Cu-Ni by gas-shielded inert-arc process. Tables and radiographs. (K1, Cu, Ni)

118-K. The Preheating and Postheating of Pressure Vessel Steels. Robert D. Stout. *Welding Journal,* v. 32, Jan. 1953, p. 14s-22s.

Soundness and mechanical properties of welds. Includes table containing recommended preheating

and postheating temperatures for various C contents and thicknesses of grades of steel commonly used for pressure vessels. Graphs. (K general, CN)

119-K. Report on the Design of Pressure Vessel Heads. *Welding Journal,* v. 32, Jan. 1953, p. 31s-41s.

Interpretive report based largely on laboratory research and theoretical investigations sponsored by Design Division of Pressure Vessel Research Committee of the Welding Research Council. (K general, T26)

120-K. High-Current Tungsten Arc in Argon, Helium and Their Mixtures. Merrill Skolnik and T. B. Jones. *Welding Journal,* v. 32, Jan. 1953, p. 55s-64s.

Experimental results of preliminary exploration study of high-current inert-gas arc welding. Tables and graphs. (K1, W)

121-K. Unionmelt Welding Applied to Steel Plant Maintenance. *Western Machinery and Steel World,* v. 44, Jan. 1953, p. 94-95.

How submerged-melt welding is accomplished, and the savings involved. (K1, ST)

122-K. (French.) **Electric Resistance Welding in Automobile Construction.** Ch. Moressee. *Revue Universelle des Mines, de la Metallurgie des Travaux Publics, des Sciences et des Arts Appliques a l'Industrie,* ser. 9, v. 8, Nov. 1952, p. 410-426.

The process, various phenomena encountered in operation, and evolution of technique of welding thin steel and light alloy plates. Micrographs, photographs, and diagrams. (K3, CN, Al, Mg)

123-K. (French.) **Evolution of Research on Weldability in French Naval Construction.** A. Audigé. *Soudure et Techniques Connexes,* v. 6, Sept.-Oct. 1952, p. 207-218.

Various tests and results developed in France. Table contains composition of carbon steels tested. 17 ref. (K9, CN)

124-K. (French.) **Development of Inert Atmosphere Welding in France.** L. Dumoulin. *Soudure et Techniques Connexes,* v. 6, Sept.-Oct. 1952, p. 221-235.

Argon-arc welding of light alloys and stainless steel, spot welding, composition of welded materials and numerous examples of application. Data are tabulated and charted. Photographs, diagrams. (K1, Al, Mg, SS)

125-K. (German.) **Cracking of Aluminum Alloy Welds.** H. Koch and K. Nagel. *Schweissen und Schneiden,* v. 4, Oct. 1952, p. 347-356.

Test procedures for determining weld cracking of light metals, its advantages, disadvantages, and results; explanation of weld cracking by hot shortness ranges of alloys; the influence of eutectic components; and healing of cracks. Advantages, disadvantages, and results of test. 16 ref. (K9, Al)

126-K. (German.) **Early and Late Pressure Welding.** H. v. Neuenkirchen. *Schweissen und Schneiden,* v. 4, Oct. 1952, p. 360-361.

These new terms, early and late, define boundaries between recrystallization welding and pressure welding giving welders a proper understanding of the processes and minimizing difficulties in designating future processes. (K2)

127-K. (German.) **Bolt Welding.** F. Busse. *Schweissen und Schneiden,* v. 4, Oct. 1952, p. 362-363.

Possibilities, apparatus, and procedure of bolt welding by the Cycarc process. (K1, K13)

128-K. (German.) **Newer Information in the Field of Torch Stress Relieving in Weld Seams.** Hans Kunz. *Schweissen und Schneiden,* v. 4, Dec. 1952, p. 55-64.

Expansion and contraction in welds are compared with the deformation mechanism in torch stress relieving as reversible processes. 20 ref. (K9, J1)

129-K. (German.) **Acetylene Welding Without Burner Detonation.** J. Beckstroem. *Schweissen und Schneiden,* v. 4, Dec. 1952, p. 75-79.

Importance of gas ratios and processes in the torch. Causes of detonation were determined experimentally. A new torch is described. (K2)

130-K. (Spanish.) **The Technique of Welding in Drilling Tools.** A. Matting and A. Ruiz Rubio. *Ciencia Tecnica de la Soldadura,* v. 11, July-Aug. 1952, p. 5-16.

Various methods such as electric arc and resistance welding for reinforcing handles of drills. Possibility of cementing metal and nonmetal parts together by means of plastics. Micrographs, photographs. 19 ref. (K general, TS)

131-K. (Spanish.) **Spot Welding and Its Application in the Construction of Railroad Material.** Mariano Izuzquiza. *Ciencia Tecnica de la Soldadura,* v. 11, July-Aug. 1952, p. 17-30.

Equipment and processes in manufacture of railroad coaches and electric locomotives. Photographs. Data are tabulated and charted. (K3, CN)

132-K. (Spanish.) **The Joining of Metals With Different Melting Points and Hardness by Means of Wedge Welding.** Wilhelm Hofmann, Hans-Jochen Husmann, and Rolf Koppe. *Ciencia Tecnica de la Soldadura,* v. 11, July-Aug. 1952, p. 39-42.

Welding process by which a wedge of harder metal is introduced into softer metal. Examples of application. (K6, Al, Cu)

133-K. Thin Phos-Copper Strips Speed Brazing. R. E. Ballentine. *American Machinist,* v. 97, Feb. 2, 1953, p. 124-126.

Reports that 30% average reduction in cost of brazing Cu and Cu alloys is obtained from preplaced phosphor copper strip in thicknesses as low as 0.005 in. Photographs. (K8, Cu)

134-K. Welding Research. *Automobile Engineer,* v. 43, Jan. 1953, p. 33-37.

Methods and equipment employed at Abington by the British Welding Research Association. Photographs. (K general)

135-K. Ultrasonic Soldering. Leo Walter. *Canadian Metals,* v. 16, Jan. 1953, p. 18, 20.

Successful soldering of light metals is made easy and without need for flux. (K7, Al, Mg)

136-K. Ultrasonic Soldering to Rectify Light-Alloy Castings. *Canadian Metals,* v. 16, Jan. 1953, p. 32-33.

Ultrasonic soldering iron using Sn-Zn solder on Al patterns and light alloy castings. (K7, Al)

137-K. Stainless Steel Tow Carts of All-Welded Construction. *Canadian Metals,* v. 16, Jan. 1953, p. 42.

Brief description in which automatic and hand welding were used. (K1, SS)

138-K. Welding in Marine Engineering. H. N. Pemberton. *Engineering,* v. 175, Jan. 16, 1953, p. 73-76; Jan. 23, 1953, p. 122-124.

Role of welding in construction of boilers, steam pipe-work, engines, turbines, and auxiliary plant. New construction and repair work. Photographs and diagrams. (K general, K25, ST)

139-K. The Technology of Automatic Welding in the Soviet Union. Recent Advances. J. Mannin. *Engineers' Digest,* v. 13, Dec. 1952, p. 409-411, 438-440; v. 14, Jan. 1953, p. 14-17.

Survey of techniques of automatic arc welding under granulated flux, as developed and practiced in the Soviet Union. Improvements achieved since consolidation of basic procedures around 1947. (K1)

140-K. (English.) **Some Remarks on the Determination of Arc Welding Conditions and Subsequent Postheating for Martensitic Creep Resisting Steels.** T. Noren. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 122, 9 pages.

Hardenability testing as related to welding and calculation of preheating temperatures. (K1, J26, AY)

141-K. (French.) **Aspects of the Welding Heating Cycle.** Henri Granjon. *Fourth International Congress on Industrial Heating* (Paris), No. 177, 8 pages.

Positions of the welding heating cycle among heat treatments, and axial quenching tests on a bar heated on the end. Micrographs. (K general, J26)

142-K. Controlled Temperatures Insure Quality Welds in B-36 Landing Gear. *Industry & Welding,* v. 26, Feb. 1953, p. 42-45.

Use of automatically controlled heating equipment, laboratory designed procedures, and graphic recordings of preheat and postheat temperature cycles to reduce faulty arc welds. Photographs. (K1, AY)

143-K. Consolidation of Locomotive Welding Increases Production 33 Percent. *Industry & Welding,* v. 26, Feb. 1953, p. 58-60.

Measures used for increased efficiency at G.E., Erie, Pa. Works. Arc welding is used in all operations. (K1, T23)

144-K. Problems in Resistance Welding. H. B. Wood. *Industry & Welding,* v. 26, Feb. 1953, p. 66-67, 69.

Utility problem of providing adequate voltage for welding, without disturbing service to lighting and power customers. Tables. (K3)

145-K. Oxy-Acetylene Welding Solves Defense Plant Maintenance Problems. John H. Redmond. *Industry & Welding,* v. 26, Feb. 1953, p. 70, 73, 76, 78-79, 109.

Use of oxy-acetylene welding and cutting in routine maintenance and repair operations. Photographs. (K2, G22)

146-K. Low Hydrogen Electrodes Repair Shaft of "Unknown" Steel. *Industry & Welding,* v. 26, Feb. 1953, p. 104, 106, 108.

Techniques and materials used. Photographs. (K1, ST)

147-K. Brazing With Silver Alloys. A. Stanley Cross, Jr. *Machine and Tool Blue Book,* v. 49, Feb. 1953, p. 208-214, 216-222, 224, 226-228, 230.

Use of Cu, Al, and Ag alloys, suitable fluxes, methods of brazing, preparation for brazing, and problems encountered with Cu, brasses, bronzes, Ni alloy steel, carbon steel, cast iron and stainless steels as base metals. Diagrams. (K8, Cu, Al, Ag, Ni, AY, CN, CI, SS)

148-K. Causes and Cures of Common Welding Problems. *Machine and Tool Blue Book,* v. 49, Feb. 1953, p. 239, 241, 243, 245, 246.

Tabulated form including problem, cause, and cure. Photographs. (K general)

149-K. Designing for Spotwelding. *Machine Design,* v. 25, Feb. 1953, p. 157-159.

Basic design standards for engineering efficient spot welded assemblies from standpoint of strength and economy. Graphs. (K3)

150-K. Inert Gas Welding Plant. *Machinery Lloyd* (Overseas Ed.), v. 25, Jan. 17, 1953, p. 91-93, 95, 97.

Uses, practicality, and parts involved, including a.c. transformer, high-frequency ionizer, water-cooled welding tool, and replaceable tungsten electrode with argon gas supply. Photographs. (K1)

151-K. Postwar Trends in German Welding Technology. Hans von Hoffe. *Metal Progress,* v. 63, Jan. 1953, p. 130-134, 168, 170.

Equipment and techniques. Manual gas welding; cold (forge) welding; weld testing methods; welded construction; training and qualification of welders. (K general, Al, Cu, ST)

152-K. Designing and Building Arc Welding Fixtures. H. G. Frommer. *Modern Machine Shop,* v. 25, Feb. 1953, p. 114-129.

Three classes of welding fixtures: tacking, welding, and holding fixtures. Diagrams and photographs. (K1)

153-K. Joining Distortion Minimized. Helmut Thielsch and John R. Charlton. *Steel,* v. 132, Feb. 9, 1953, p. 92-96.

Use of resin bonding agents for joining, compared with welding. Diagrams and tables. (K12)

154-K. The Selection and Care of Welding Leads. S. E. Smith. *Welder,* v. 21, Oct.-Dec. 1952, p. 78-79.

General discussion on cable size and cable connections. (K1)

155-K. Spotlight on Arc Welding. *Welder,* v. 21, Oct.-Dec. 1952, p. 80-83.

Work of Burnett and Rolfe Ltd. of Rochester who specialize in production of welded fabrications in stainless steel, Al, and other metals. Murex stainless steel electrodes were used. Photographs. (K1, SS, Al)

156-K. Mexico Claims World's Longest Welded Spans. Guillermo S. Polanco. *Welding Engineer,* v. 38, Feb. 1953, p. 26-29, 33.

General description, which includes principal framework, frame joints, computation of loads, and balcony erection. Diagrams and photographs. (K general, T26, CN)

157-K. Seven Tough Jobs and How They Were Licked. Fred M. Burt. *Welding Engineer,* v. 38, Feb. 1953, p. 30-33.

Use of metal-arc, oxy-acetylene, oxyhydrogen, submerged-arc, inert-arc, and inert-arc metal-arc welding techniques for rebuilding cast steel shells to new dimensions, bimetallic component of thermostat, aircraft landing gear assembly, light-gage Al ducts, tanks to stand pressure of 800 psi., fabricating truncated cones of sheet Al, and rings from Al extrusions. Photographs. (K1, K2, CI, Al)

158-K. Current, Force and Time. How They Are Measured on Resistance Welders. Dean L. Knight. *Welding Engineer,* v. 38, Feb. 1953, p. 34-38.

Includes type of equipment and methods of measuring. Photographs and diagrams. (K3)

159-K. 10 Weeks Make a Welder. H. C. Phelps. *Welding Engineer,* v. 38, Feb. 1953, p. 39-41.

Army course for training welders. (K general, U9)

160-K. Roll-Spot Technique Doubles Welding Speed. *Welding Engineer,* v. 38, Feb. 1953, p. 42.

Shows how roll-spot and seam welding time can be decreased. (K3)

161-K. To Keep Pace With Industry Tempo It's 'Back to School' for Welders. *Western Metals,* v. 11, Jan. 1953, p. 65-67.

Instruction and discusses typical problems of students at new Eutectic Welding Institute in Los Angeles. Photographs. (K general, U9)

162-K. Putting the Squeeze on Cold Welding. Norman Grossman. *Product Engineering,* v. 24, Feb. 1953, p. 176-181.

Basic design data on cold welding are available. They incorporate a critical evaluation of advantages and limitations of process and indicate factors which require additional study. Graphs and diagrams. (K5, Al)

163-K. Manual Hidden Arc Lowers Fabricating Times. James Quigley. *Steel,* v. 132, Feb. 16, 1953, p. 74-75.

Lays down bead four to five times as fast as hand arc welding methods. Welds with deep penetration and little stress are achieved. Photographs. (K1)

164-K. Shielding Arc-Welding Processes for Jet-Engine Components. K. H. Koopman. *Welding Journal,* v. 32, Feb. 1953, p. 103-115.

Previously abstracted from *Iron Age.* See item 114-K, 1953. (K1, AY, SS)

165-K. Vacuum Tightness of Welded and Brazed Aluminum Containers. Mike A. Miller and Allen S. Russell. *Welding Journal,* v. 32, Feb. 1953, p. 116-118.

Welded and brazed Al containers especially prepared with butt and perpendicular joints were tested for vacuum tightness. Methods of welding and brazing. Diagrams and tables. (K general, Al)

166-K. The Nature of Heat in the Welding Process. Robert T. Howard. *Welding Journal,* v. 32, Feb. 1953, p. 127-131.

Ideas about heat and how it behaves; role of heat in the metallurgical variables; and heat and the atomic model. Stainless steel was used as an example. Photographs and diagrams. (K general, P12, SS)

167-K. Two Jigs for Welding Pipe. H. J. Adolf. *Welding Journal,* v. 32, Feb. 1953, p. 133.

Jigs can be used for pipe, tube, and bar stocks of all shapes. (K general, CN)

168-K. How Expansion and Contraction Affect Welding Results. L. M. Amburgey. *Welding Journal,* v. 32, Feb. 1953, p. 142-144.

General theory and basic control procedures that welding operator should consider on his welding jobs whether they are repair or fabrication. Diagrams. (K general)

169-K. Doubles Welding Speeds With Fast Roll-Spot Technique. *Welding Journal,* v. 32, Feb. 1953, p. 148-149.

Satisfactory technique for more rapid spot welding. Photographs. (K3)

170-K. Practical Aspects of Welding Titanium Alloys. J. J. Chyle and I. Kutuchief. *Welding Journal,* v. 32, Feb. 1953, p. 65s-73s.

Scope of investigation using inert-gas tungsten-electrode metal-arc process included factors and welding procedures such as scarf design, direction of travel (backhand or forehand), selection of He or argon gases and sequence of layer deposition. Effect of heat treatment on mechanical properties, radiographic examination, determination of mechanical and physical properties of welds, and chemical analysis of the weld metal and parent stock. Diagrams, graphs, and photographs. (K1, Ti)

171-K. Metal-Arc Welding of Aluminium-Magnesium Plate. *Welding Research,* v. 6, Dec. 1952, p. 106r-111r.

A report prepared from LM.1 Committee document, "Interim Report on an Investigation of the Arc Welding of Thick Aluminium-5% Magnesium Alloy", by J. G. Ball and P. T. Houldcroft. Test results, welding technique, and examination of microsections. Macro and micrographs. (K1, K9, Al)

172-K. Resistance Welding of Cold-Headed Bolts. J. E. Roberts. *Welding Research,* v. 6, Dec. 1952, p. 118r-123r.

Development of bolt head design for projection welding to sheet material (from 12 to 20 s.w.g.). Concludes that bolts made to provisional design can be used on long production runs. Tables. (K3, T7, CN)

L

CLEANING, COATING AND FINISHING

109-L. Flaking of Hot Dipped Zinc Coatings. *British Steelmaker,* v. 19, Jan. 1953, p. 20-21.

Briefly discusses cause. (L16, Zn)

110-L. Wear-Resisting Phosphate Coatings on Steel. *Engineering,* v. 175, Jan. 9, 1953, p. 57.

"Parkerizing" and "Bonderizing" processes for phosphating ferrous and nonferrous metals and alloys. Micrographs. (L14)

111-L. Conveyorized Cleaning and Coating of Aluminum Windows. S. K. Jordan. *Industrial Finishing,* v. 29, Jan. 1953, p. 20-22, 24.

Plant layout and procedure for coating Al windows with a clear water-white methacrylate type lacquer. Photographs and diagram. (L26, Al)

112-L. How to Cut the Cost of Finishing Your Product. C. Raymond Syer, Sr. *Industrial Finishing,* v. 29, Jan. 1953, p. 28-30, 32, 34, 36-37.

Selection of equipment, removal of scale, dust, tar, and heavy soil; setting up and maintaining process controls; features of cleaning and phosphating machine; and evaluation tests and cost data. (L12, L14)

113-L. Traveling Spray Booths Used in Painting Pullman Cars. J. W. Limbrock. *Industrial Finishing,* v. 29, Jan. 1953, p. 40-42, 44, 46.

Use and advantages of using movable spray equipment. (L26)

114-L. Modern Plating Equipment is Designed for Any Shop. Plating Barrels and Tanks. John E. Hyler. *Iron Age,* v. 171, Jan. 22, 1953, p. 95-100.

Advantages of using barrel and tank plating methods for small pieces. Photographs. (L17)

115-L. Making Mould Cavities by Electro-Deposition. *Machinery* (London), v. 82, Jan. 16, 1953, p. 95-101.

Methods employed in production of a variety of tools having electroformed cavities. (L18)

116-L. Carbide Hardfacing by New Inert-Gas-Arc Method. J. J. Barry. *Materials & Methods,* v. 37, Jan. 1953, p. 80-81.

Process in which tough, wear resistant coatings are deposited on steel. Advantages include: automatic, fast deposition; shallow heat-affected zone; good bonding; and little dilution of carbide particles. Photographs. (L24, ST, C-n)

117-L. Designations and Applications of Chemical and Electrochemical Treatments for Magnesium Alloys. *Materials & Methods,* v. 37, Jan. 1953, p. 121.

Tabulated information on cleaning and coating. (L general, Mg)

118-L. Cold Flow of Pipe Coating Bitumens. Charles E. Lee. *Pipe Line News,* v. 25, Jan. 1953, p. 64, 66, 68.

New methods being used to predict the suitability of bitumens for pipe coating service and for quality control of shipments. (L26)

119-L. Descaling. A Review of Methods in Use in France and Particularly of the Gorcy System. André Liné. *Wire Industry,* v. 20, Jan. 1953, p. 66, 69-70, 83.

Includes features of the Gorcy system, drawing descaled wire, and subsequent processing of the wire. Diagrams. (L10, F28)

120-L. Economies in the Use of Zinc Can be Brought About by Careful Operation and Well Planned Proc-

AMERICAN CHEMICAL PAINT COMPANY

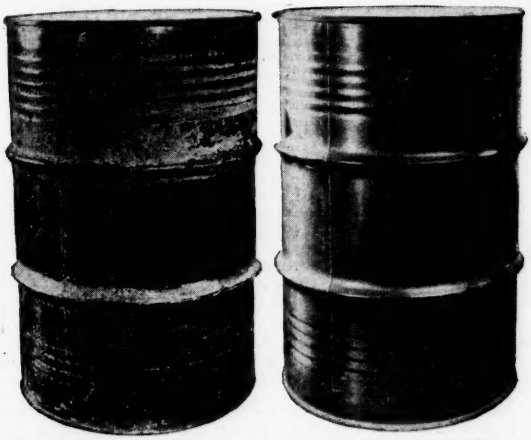
AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet

Subject: HOW *GRANODIZING* PROTECTS STEEL DRUM SURFACES FROM RUST AND IMPROVES PAINT ADHESION

NEW DEVELOPMENT IN CONTAINER INDUSTRY

United States Steel Products Division, United States Steel Company is now producing grease-free, scale-free, rust-inhibited steel drums. A chemically clean metal surface plus a "Granodine"* non-metallic zinc phosphate coating insures maximum finish durability and underpaint rust-resistance. *Trade Mark Reg. U.S. Pat. Off.



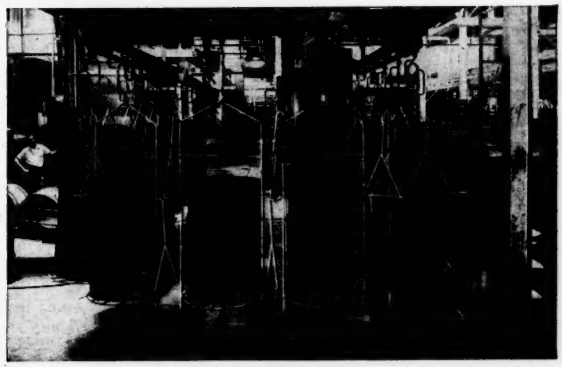
ORDINARY PAINTED DRUM after a year of exposure to weather is badly rusted. Rust was very apparent after only one week.

U. S. S. RUST-INHIBITED DRUM of similar type shows absolutely no rust after same year's test.

THE PROTECTIVE CHEMICAL TREATMENTS

The Granodizing process embodies the following steps:

1. Grease and dirt removal
2. Full scale removal, after welding the side seam
3. Zinc phosphate coating with "Granodine"
4. Acidulated rinsing in "Deoxylyte" solution



Port Arthur, Texas, Cleaning Line

U. S. S. drums about to enter the 400 foot cleaning and treating line. Powerful impingement sprays directed at the fabricated shell, head, and bottom, insure that the entire interior and exterior of the drum will receive full cleaning and rust-inhibiting treatment.

ADVANTAGES OF GRANODIZED STEEL DRUMS

These new phosphate-coated steel drums exhibit many advantages for companies using these containers.

They are chemically clean, "water-break free" inside, free of contaminating residues such as grease, oil, drawing and stamping compounds. When the familiar handkerchief test is applied to United States Steel Products' containers processed by their new finishing technique, no contamination of any kind is left on the cloth.

They are free of mill-scale. United States Steel Products is the first steel drum manufacturer to remove harmful mill scale completely ahead of the zinc phosphate coating stage.

They are rust-inhibited with a zinc phosphate-coating. These new steel drums have the added advantage of a non-metallic, paint-bonding "Granodine" zinc phosphate coating. This has been standard practice for many years in the automotive and appliance industries for long-lasting paint protection and metal preservation.

CHEMICALS ACP PROCESSES

WRITE FOR INFORMATION ON "GRANODINE" AND ON YOUR OWN METAL PROTECTION PROBLEMS

CHEMICALS ACP PROCESSES

esses. Hans Ruckemesser. *Draht* (Wire) (English Ed.), Dec. 1952, p. 40-41.

Discusses relative advantges of wet and dry galvanizing. (L16, CN)

121-L. (German.) On the Theory and Precomputation of the Cathode Current Distribution in Plating Electrolytes. Julius Steiner. *Zeitschrift für Physikalische Chemie,* v. 200, July 1952, p. 53-69.

Current distribution can be figured from the conductivity and the potential current density curve, using a simple formula determined empirically for each type of electrode and bath. Chemical composition of electrodes does not need to be known. 22 refs. (L17)

122-L. Properties of Steel for Enameling. Part II. M. B. Gibbs and F. R. Porter. *Finish,* v. 10, Jan. 1953, p. 24-25, 92.

General properties of base metals. (L27, CN)

123-L. Protective Coatings for Die Casting Dies. W. M. Halliday. *Canadian Metals,* v. 16, Jan. 1953, p. 28-30.

Several economical, effective, and simply applied die coatings; advantages to be gained from use on Sn, Pb, mild steel, and Zn-base alloys. (L general, E13, Sn, Pb, CI, Zn)

124-L. Electrolytic Process Removes Discoloration in Stainless Welds. *Industry & Welding,* v. 26, Feb. 1953, p. 50, 52, 54, 91.

A simple, fast, and economical method of removing heat discoloration from welded areas. Photographs. (L13, K general, SS)

125-L. A Designer's Guide to Vitreous Coatings. (Concluded.) Robert L. Stedfeld. *Machine Design,* v. 25, Jan. 1953, p. 141-149; Feb. 1953, p. 166-176.

Summarizes service properties including optical properties, acid and corrosion resistance, thermal and mechanical properties, and miscellaneous basic properties. Part II: Metal selection, enamel processing, and design for enameling. Tables and graphs. 19 ref. (L27, Fe, EG-a)

126-L. (French.) Electrolytic Cleaning and Its Applications. I. Epelboin. *Revue de Métallurgie,* v. 49, Dec. 1952, p. 863-874.

Methods and bath compositions. Effects of electrolytic polishing on mechanical, electrical, and magnetic properties of materials. (L13, Q general, P15, P16, Co, Pb, Fe, Ni, Sn)

127-L. (German.) New Methods for the Surface Protection of Zinc and Tin. *Werkstoffe und Korrosion,* v. 3, Dec. 1952, p. 460-461.

Chromate layers, KFeCn treatment, and anodic treatments for protection of Zn. Anodic oxidation in weak NH_4OH and black coloring of Sn and Sn alloys in various solutions. (L14, L19, Zn, Sn)

128-L. Wash Primers for Magnesium. A. R. Hempel, H. W. Lasch, G. Schurr, and M. van Loo. *American Paint Journal,* v. 37, Feb. 16, 1953, p. 76, 78, 80, 82, 84.

Certain wash primers can be formulated to exhibit good adhesion, low blistering tendency resulting from H_2 evolution during application, and good corrosion resistance as primers over bare Mg. Tables. (L14, Mg)

129-L. High Temperature Ceramic Coatings for Chemical Use. W. A. Barrows. *Finish,* v. 10, Feb. 1953, p. 24-26.

Base metals, type of coating, design, and fabrication must be considered for successful ceramic coatings. Photographs. (L27)

130-L. Finishing Parts for Central Heating Units in a 15-Minute Cycle. Sutton Kinter. *Finish,* v. 10, Feb. 1953, p. 32-33, 80, 82.

Degreasing operation and use of infra-red oven. (L12, CN)

131-L. Phosphating—Plant Requirements. A. W. Putnam. *Metal Industry,* v. 82, Jan. 30, 1953, p. 89-92.

Successive stages for each operation of the process followed in the plant. (L14)

132-L. Finishing Refrigerators With Hot Sprayed Enamel. Frank L. Bonem. *Products Finishing,* v. 17, Feb. 1953, p. 24-32, 34.

Finishing operations on Philco refrigerators employing synthetic enamel. Photographs. (L27, CN)

133-L. The "Why" of Modern Polishing Abrasives. Henry R. Power. *Products Finishing,* v. 17, Feb. 1953, p. 44, 46, 48, 50.

Characteristics necessary for polishing abrasives. (L10)

134-L. Chromium Plating Methods. Allen G. Gray. *Products Finishing,* v. 17, Feb. 1953, p. 58, 60, 62, 66, 68, 72, 74, 76, 78, 80, 82.

Finishing gages, surface preparation for hard Cr plating, plating Cr on Cr, effect of Cr plating on fatigue strength, self-regulating high-speed Cr plating bath, method used for fatigue testing at University of Michigan, and Bureau of Standards chrome plating endurance tests. (L17, Q7, Cr)

135-L. Experiments on Zinc Recovery From Residues and the "Quality" of Recovered Metal. N. B. Rutherford. *Sheet Metal Industries,* v. 30, Feb. 1953, p. 119-134.

Emphasis was placed on simple methods of treatment which can easily and immediately be applied by even small general galvanizing firms. Photographs and tables. 27 ref. (L16, A8, Zn)

136-L. Plating on Aluminum. *Steel,* v. 132, Feb. 16, 1953, p. 76-78.

Recent studies show how to smooth out production line difficulties and improve corrosion resistance of plated products. Zincate pretreatment. Photographs. (L17, Al)

137-L. Shot Blasts 430 Cleaning Costs. *Steel,* v. 132, Feb. 16, 1953, p. 86, 89.

Shot-blast cleaning machine placed on strip annealing and pickling line saves time and gets more uniform product. (L10, SS)

138-L. Selection and Evaluation of Methods of Hard Facing. J. J. Barry. *Welding Journal,* v. 32, Feb. 1953, p. 119-126.

Includes welding methods of applying hard facing materials, oxyacetylene method, electric arc method, submerged and open arc methods, carbon arc, H_2 method, inert-gas-shielded method, and automatic hard facing of tool joints with W carbide. Micrographs and photographs. (L24, CI, W, C-n)

139-L. (Pamphlet.) Painting Practice for Aluminium. Aluminium Development Association (London), Information Bulletin No. 20, Dec. 1952, 19 pages.

Broad survey which shows that painting of Al largely follows established practice for other metals with certain modifications to suit particular material. Also deals with cleaning and degreasing, pretreatment where necessary, choice of paint system, single coat systems, multi-coat systems, and repainting of small and large components and structures. (L26, Al)

140-L. (Book—German.) (Nonmetallic Inorganic Coatings.) Nichmetallische anorganische Uberzüge. Willi Machu. 404 pages. 1952. Springer-Verlag, Vienna, Austria $13.50.

Nonmetallic inorganic coatings for protection of metals against corrosion, and for purposes of improving appearance of metals. Sections on anodic coatings for light metals, metal coloring, phosphate coatings, enamels. (L14, L19, L27)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

56-M. A Simple Goniometric Method for Examining Preferred Orientation in Etched Metal Polycrystals. Pamela Dunsmuir. *British Journal of Applied Physics,* v. 4, Jan. 1953, p. 27-29.

Simple apparatus for determining orientation of etched metal crystals. Multi-colored light source enables rapid determination of preferred orientation in polycrystals. Tungsten was used in experiments. (M23, W)

57-M. Metal-Hydrogen Systems. III. The Uranium - Hydrogen System. Thomas R. P. Gibb, Jr., James J. McSharry, and Henry W. Kruschwitz, Jr. *Journal of the American Chemical Society,* v. 74, Dec. 20, 1952, p. 6203-6207.

Experimental data and results. Graphs and tables. (M24, N1, U)

58-M. A Method of Determining Orientations in Aluminium Single Crystals and Polycrystalline Aggregates. G. E. G. Tucker and P. C. Murphy. *Journal of the Institute of Metals,* v. 81, Jan. 1953, p. 235-244.

Method for construction of (100) pole figures from angular measurements of etch-pits that are developed in micrographically prepared commercial and super-purity Al. Suitable etching reagents, and technique of angular measurement using a metallurgical microscope. Micrographs. (M23, Al)

59-M Regarding Sigma Phase Formation. David S. Bloom and Nicholas J. Grant. *Journal of Metals,* v. 5, Jan. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 88.

Sigma phase formation of the first transition group metals. Suggests future studies using Mn as base element. (M27, V, Cr, Mn, Fe, Co, Ni)

60-M. A Theory of the Deviation From Close Packing in Hexagonal Metal Crystals. John B. Goodenough. *Physical Review,* ser. 2, v. 89, Jan. 1, 1953, p. 282-294.

A mechanism is proposed to show how Fermi surface interacts with Brillouin zone boundaries. Direction and relative magnitude of variation of c/a ratio for hexagonal crystals from ideal value for close packing are predicted as a function of electron-atom ratio, and these predictions are compared with values of lattice parameters which are reported in the literature. Diagrams. 24 ref. (M26)

61-M. The Mean Shear Stress in an Array of Dislocations and Latent Hardening. A. N. Stroh. *Proceedings of the Physical Society,* v. 66, sec. B, Jan. 1, 1953, p. 2-6.

Mathematical analysis. 9 ref. (M26)

62-M. Studies and Experimental Investigations for the Development of Phase Diagrams of the Titanium-Chromium and Titanium-Copper Alloy Systems. Part 2. The Titanium-Copper and the Titanium-Chromium Phase Diagrams. Arnold S. Joukainen and Frank B. Cuff. *U. S. Air Force, Air Research and Development Command,* Wright Patterson Air Force Base, Technical Report 6595, Part 2, Dec. 1951, 41 pages. (M24, Ti, Cr, Cu)

63-M. (French.) An Etching Agent Revealing Segregation in Aluminum Alloys. Charlotte Buckle, Christiane

Changarnier, and Jean Calvet. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences,* v. 235, Nov. 3, 1952, p. 1040-1041.

Proposes an aqueous solution of 4% potassium permanganate and 2% soda for Al-Mg, Al-Cu, Al-Si, Al-Mn, Al-Cr, and Al-Ti alloys. Techniques and results. (M21, Al)

64-M. (French.) Thermoelectric Force. Accurate Methods and Applications to the Study of Heterogeneity of Alloy Structures. F. Aubertin and C. Crussard. *La Metallurgia Italiana,* v. 44, Nov. 1952, p. 548-559.

Methods and data obtained on Al alloys and mild steels. Data are tabulated and charted. 15 ref. (M23, P15, N12, Al, CN)

65-M. (German.) The Structure of Weiss's Areas Around Holes in the Surface of Iron-Silicon Crystals. Bruno Elschner. *Annalen der Physik,* v. 11, no. 1, 1952, p. 45-47.

Beveling and magnetic orientation around holes and inclusions in mechanically and electrolytically polished specimens were studied. Photographs and diagrams. (M26, P16, Fe, Si)

66-M. (German.) On the Question of Adapting the Electron Microscope for Structural Investigation of Steels. Angelica Schrader and Franz Wever. *Archiv für das Eisenhüttenwesen,* v. 23, Nov.-Dec. 1952, p. 489-495.

The electron microscope was used in two cases of alloy steel where the light microscope had failed. It was shown that cementite formation precedes ferrite during pearlitic transformation. In the intermediate transformation step ferrite formation occurs first. (M21, N8, AY)

67-M. The Texture of Iron Scale. Part IV: Investigation of Temperature Range of 930-1470° F. V. I. Arkharov and F. P. Butra. Henry Brutcher, Translation 2869, 7 pages.

Previously abstracted from *Zhurnal Tekhnicheskoi Fiziki.* See item 6b-77, 1948. (M26, Fe)

68-M. Carbides in High Speed Steel. N. T. Chebotarev. Henry Brutcher, Translation 2872, 14 pages. (From *Trudy Moskovskogo Inst. Stali im. I. V. Stalina, "Symposium XXX. Structure and Properties of Steel",* 1951, p. 256-269.)

X-ray photographs of carbide residues, their photometric evaluation, and calculation. Correlation is made between intensities of characteristic diffraction lines and calculated data. (M26, TS)

69-M. Study of Aluminum-Titanium Alloys High in Titanium. W. Gruhl. Henry Brutcher, Translation 2901, 8 pages.

Previously abstracted from *Metall.* See item 151-M, 1952. (M27, Al, Ti)

70-M. Lattice Parameter of Beta Titanium at Room Temperature. B. W. Levinger. *Journal of Metals,* v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 195.

Brief description. Graphs. 9 ref. (M26, Ti)

71-M. High Temperature Modification of $TiCr_2$. B. W. Levinger. *Journal of Metals,* v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 196.

X-ray diffraction study of structure. 6 ref. (M26, Ti, Cr)

72-M. System Zirconium-Copper. C. E. Lundin, D. J. McPherson, and M. Hansen. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 273-278.

Experimental procedure and features of Zr-Cu phase diagram. Tables, micrographs, and graphs. 8 ref. (M24, Zr, Cu)

73-M. System Zirconium-Chromium. R. F. Domagala, D. J. McPherson, and M. Hansen. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 279-283.

On basis of metallographic analysis, incipient melting data, thermal analysis work, and X-ray diffraction, phase relationships in 0-50 at. % Cr region were carefully resolved. Phase relationships in 50-100 at. % region were outlined, and single intermediate phase, $ZrCr_2$, was established in the system. Graphs, tables, and micrographs. 8 ref. (M24, Zr, Cr)

74-M. Vanadium-Oxygen Solid Solutions. A. U. Seybolt and H. T. Sumsion. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 292-299.

Results of an investigation of V-rich V-O solid solutions, indicating structure and lattice parameters of α and β solutions and their approximate temperature-composition existence. Micrographs, graphs, and tables. 14 ref. (M26, V)

75-M. Titanium-Manganese System. D. J. Maykuth, H. R. Ogden, and R. I. Jaffee. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 225-230.

Phase diagram for alloys containing from 0-66.9% Mn was determined. Liquid-solid relationships, solid-state equilibria, and X-ray diffraction. Tables, micrographs, and graphs. 10 ref. (M24, N12, Ti, Mn)

76-M. Titanium-Tungsten and Titanium-Tantalum Systems. D. J. Maykuth, H. R. Ogden, and R. I. Jaffee. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 231-237.

Binary phase diagrams for Ti-W and Ti-Ta systems were determined using iodide Ti as a base for Ti-rich alloys and Bureau of Mines Ti as a base for intermediate and high-alloy ranges. Micrographs, graphs, and tables. 7 ref. (M24, Ti, W, Ta)

77-M. Microstructure and Mechanical Properties of Iodide Titanium. F. C. Holden, H. R. Ogden, and R. I. Jaffee. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 238-242.

Effects of heat treatment on structure and mechanical properties of commercially produced iodide Ti. Correlation between microstructural variables and mechanical properties. Graphs, micrographs, and tables. 6 ref. (M27, Q general, Ti)

78-M. Titanium-Nickel Phase Diagram. Harold Margolin, Elmars Ence, and John P. Nielsen. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 243-247.

Ti-Ni phase diagram was investigated up to 68% Ni with iodide Ti-base alloys by metallographic, X-ray, and melting point methods, and from 68-90% Ni by examination of as-cast structures of sponge Ti-base alloys. Micrographs and graphs. 14 ref. (M24, Ti, Ni)

79-M. Titanium-Carbon Phase Diagram. Irving Cadoff and John P. Nielsen. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Metallurgical Engineers,* v. 197, 1953, p. 248-252.

Investigation in which the Ti-C phase diagram exhibits a peritectic point at 1750° C. and 0.8% C, and a peritectoid point at 920° C. and 0.48% C. Micrographs and graphs. 13 ref. (M24, Ti)

80-M. Constitution of Titanium-Rich Ti-Cr-Al Alloys at 1800° and 1400° F. Jack L. Taylor and Pol Duwez. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 253-256.

Phase boundaries in Ti-Cr-Al were established at 1800 and 1400° F. for alloys containing more than 60% Ti. Martensite transformation temperature was measured for Ti-rich alloys. Diagrams. 17 ref. (M24, N9, Ti, Cr, Al)

81-M. Effect of Small Additions of Oxygen on Lattice Constants and Hardness of Zirconium. R. M. Treco. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 344-348.

Describes investigation. Tables and graphs. 9 ref. (M26, Q29, Zr)

82-M. Thermal and Dilatometric Investigation of the Alloys of Cobalt With Chromium and Molybdenum. A. G. Metcalfe. *Journal of Metals,* v. 5, sec. 2, 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 357-364.

Observations at temperature are used to investigate phase changes in alloys containing more than 50% Co and above 1000° C. Nonsuppressible transformations in Co above 1120° C. and in intermetallic compound Co_2Cr_3 are studied. Liquidus and solidus surfaces are determined. Graphs and tables. 20 ref. (M24, Co, Cr, Mo)

83-M. Tin Bronzes. M. R. Reeve, J. S. Bowden, and J. W. Cutherbertson. *Metal Industry,* v. 82, Jan. 9, 1953, p. 23-25; Jan. 16, 1953, p. 49-52.

Report on microstructure of bronzes containing 15-18% Sn. Second part: Annealing and quenching. Micrographs. (M27, J23, J26, Cu, Sn)

84-M. Metallography—New Instrumentation and Techniques. Augustus B. Kinzel. *Metal Progress,* v. 63, Jan. 1953, p. 78-83.

Latest improvements in phase contrast, ultraviolet microscopes, color metallography, electron microscopes specimen preparation, and polishing techniques. Micrographs. (M21)

85-M. Behaviour of Carbides in Niobium Stabilised Austenitic Stainless Steel. T. V. Simpkinson. *Metallurgia,* v. 47, Jan. 1953, p. 18-24.

How variations in temperature of final hot working, heat treatment, and welding affect type and distribution of precipitated carbides seen under microscope. Tables and microphotographs. 7 ref. (M27, J general, K general, SS)

86-M. The Interaction of Negative μ-Mesons With Uranium Nuclei. W. Galbraith and W. J. Whitehouse. *Philosophical Magazine,* v. 44, Jan. 1953, p. 77-84.

Experimental procedure and results. Diagrams. 24 ref. (M25, U)

87-M. The Interaction of Dislocations and Boundaries. A. K. Head. *Philosophical Magazine,* v. 44, Jan. 1953, p. 92-94.

Evaluates image forces on a screw dislocation due to a grain boundary, or a free surface on which there is a surface film. Al was used. 5 ref. (M26, Al)

88-M. A New Parameter for Use in Discussions of the Shell Model of the Nucleus. N. Feather. *Philosophical Magazine,* v. 44, Jan. 1953, p. 103-106.

Brief theoretical discussion. (M25)

89-M. Electronic Structure of the Germanium Crystal. Frank Herman and Joseph Callaway. *Physical Review,* ser. 2, vx. 89, Jan. 15, 1953, p. 518-519.

Method of orthogonalized plane waves was used to study energy band structure of Ge crystal. Diagram. 10 ref. (M26, Ge)

90-M. A Spiral-Scanning X-Ray Reflection Goniometer for the Rapid Determination of Preferred Orientations. A. N. Holden. *Review of Scientific Instruments,* v. 24, Jan. 1953, p. 10-12.

Description and advantages. Diagrams and photographs. 4 ref. (M23)

91-M. Magnesium Alloy Research Studies. A. Jones, J. H. Lennon, R. R. Nash, W. H. Chang, and E. G. MacPeek. *U. S. Air Force, Air Research and Development Command, Wright Patterson Air Force Base.* Technical Report 52-169, Sept. 1952, 125 pages.

Diagrams show constitution at 500 and 700° F. for Mg-Li-Al and Mg-Li-Zn alloy systems which were determined by microscopic examination of alloys quenched from elevated temperatures. Tables and graphs. (M24, Mg, Li, Al, Zn)

92-M. (French.) The Structure and the Stability of Mixed Cobalt-Nickel, Cobalt-Magnesium, and Cobalt-Zinc Oxides. Jacques Robin. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences,* v. 235, Nov. 24, 1952, p. 1301-1303.

Production of the oxides. Equilibrium diagrams are plotted on the basis of investigations at varying temperatures. Results are interpreted. (M27, Co, Ni, Mg, Zn)

93-M. (French.) The Application of Sodium Bisulfite as a Micrographic Reagent for Ferritic Steels. Louis Beaujard and Jacqueline Tordeux. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Nov. 24, 1952, p. 1304-1306.

Proposes a reagent composed of 60 cc. sodium bisulfite solution and 30 cc. water, revealing the structure of steels at room temperature by differential coloring of the ferrite grains. Micrographs. (M21, ST)

94-M. (French.) Electron Diffraction Studies of Aluminum-Copper Alloys Produced by Thermal Evaporation in a Vacuum. Jean-Jacques Trillat and Noboru Takahashi. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Nov. 24, 1952, p. 1306-1308.

Experimental arrangement permitting observation of appearance of solid solution and of alloys of definite composition. 5 ref. (M22, Al, Cu)

95-M. (Book.) The Structure of Steel. Ed. 2. Edwin Gregory and Eric N. Simons. 140 pages. Blackie & Son Ltd., 66 Chandos Pl., London W. C. 2, England. 8s.

A popularly written yet accurate account of structure of various forms of steel and steel alloys. (M general, ST)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

39-N. A Prismatic Substructure Formed During Solidification of Metals. J. W. Rutter and B. Chalmers. *Canadian Journal of Physics,* v. 31, Jan. 1953, p. 15-39.

Single crystals of Sn grown from melt under a wide range of conditions are shown to exhibit a fibrous structure which manifests itself as parallel ridges on free surface of specimen and as a hexagonal network on growing solid-liquid interface. Theory is advanced which accounts for origin and observed properties of structure. Graphs, diagrams, and micrographs. 11 ref. (N12, Sn)

40-N. The Preparation of Single Crystals and Bicrystals by the Controlled Solidification of Molten Metals. Bruce Chalmers. *Canadian Journal of Physics,* v. 31, Jan. 1953, p. 132-146.

Methods that were developed for production of single crystals and bicrystals of a wide variety of metals by controlled freezing of molten metal in a horizontal "boat". Orientations are controlled by "seeding" technique. Technique is applied to Ni, Cu, Au, Ag, Al, Zn, Pb, Sn, and In. Graphs and diagrams. 8 ref. (N12)

41-N. The Effect of Minor Additions on the Age-Hardening Properties of a High-Purity Lead-Antimony Alloy. L. M. T. Hopkin and C. J. Thwaites. *Journal of the Institute of Metals,* v. 81, Jan. 1953, p. 255-260.

Experimental data revealed that little or no age-hardening occurred, after suitable treatments, in 0.85% Sb lead alloy of extreme purity. Graphs and micrographs. (N7, Pb)

42-N. Entropies of Activation in Metallic Diffusion. G. J. Dienes. *Physical Review,* ser. 2, v. 89, Jan. 1, 1953, p. 185-188.

Theoretical examination in which entropy contribution arising from altered vibrational frequencies around saddle point is estimated. Concludes that negative over-all entropies of activation are theoretically permissible and are likely to arise when over-all activation energy is small. 21 ref. (N1, P12)

43-N. Distribution Coefficient of Indium in Germanium on Crystallization. J. J. Dowd and R. L. Rouse. *Proceedings of the Physical Society,* v. 66, sec. B, Jan. 1, 1953, p. 60-61.

Distribution of In impurity in a Ge ingot was measured using radioactive tracer technique. (N12, S19, In, Ge)

44-N. (French.) Speed of Sound and the Density of the Stages of Thermal Decomposition of Martensite in Steels. Georges Vidal and Pierre Lescop. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences,* v. 235, Nov. 17, 1952, p. 1221-1223.

Variation of the speed of sound as a function of physical and chemical variations of length during decomposition of martensite was studied. Results are charted. (N8, P10, ST)

45-N. (German.) Effect of Aging Several Years on Cold-Deformed Soft Open-Hearth Steel. Hans Jungbluth and Eugen Schmidtmann. *Archiv für das Eisenhüttenwesen,* v. 23, Nov.-Dec. 1952, p. 439-441.

Samples of 0.09% C, 0.16% Si, 0.33% Mn steel, aged 26 years, were compared with unaged steel. No noteworthy crystallization recovery could be determined even at 75% deformation. X-ray examination also disclosed no significant differences. (N7, CN)

46-N. (German.) Initiation of Intermediate Transformation of Steel by Small Amounts of Alpha Iron. Werner Jellinghaus. *Archiv für das Eisenhüttenwesen,* v. 23, Nov.-Dec. 1952, p. 459-470.

Transformation processes of four low alloy steels were studied. Data are tabulated and charted. Photomicrographs. 15 ref. (N8, AY)

47-N. (German.) Orientation of Crystals After Transformation of Iron. Helmut Neerfeld. *Archiv für das Eisenhüttenwesen,* v. 233, Nov.-Dec. 1952, p.471-473.

Alpha crystals were found arranged in various patterns. A given arrangement of γ crystals changed to a definite arrangement of α crystals. (N8, Fe)

48-N. (German.) Report on Recrystallization of Cu-Mn-Ni Alloys. O. Dahl and K. L. Dreyer. *Metall,* v. 6, Dec. 1952, p. 753-755.

Preliminary studies revealed that very high hardness of such alloys can be achieved by suitable heat treatment, especially in combination with cold deformation. This alloy group may be valuable to industry. Charts and micrographs. 4 ref. (N5, Cu, Mn, Ni)

49-N. Diffusion of Carbon in Austenite. M. E. Blanter. Henry Brutcher, Translation 2263, 14 pages.

Previously abstracted from *Zhurnal Tekhnicheskoi Fiziki.* See item 4b-23, 1948. (N1, N8, CN)

50-N. On the Fundamental Concepts of the Theory of Phase Transformation in Solids. V. I. Arkharov. Henry Brutcher, Translation 2851, 18 pages. *OTN,* 1951, p. 1744-1751.

Reviews recent changes in concepts regarding phase transformations in alloys and, in particular, steel. Analogy made between thermoelastic martensite and elastic twinning in which one true criterion of diffusionless mechanism can be distinguished. Previously abstracted from *Izvestiia Akademii Nauk SSSR.* See item 162-N, 1952. (N general)

51-N. Analysis of Process of Absorption of Gases by Metals. Communication II. Absorption of Hydrogen and Nitrogen by Iron. A. Diiakonov and A. Samarin. Henry Brutcher, Translation 2875, 10 pages. (From *Izvestiia Akademii Nauk SSSR, Otd. Tekh. Nauk,* Jan. 1946, p. 121-126.)

Literature data on solubility of H_2 in Fe plotted as log K_H vs. 1/T, and advantage of this method of plotting. Calculation of heat effect and free-energy changes in solution of H_2 in Fe. Particulars on known nitrides Fe_2N and Fe_4N, and on absorption of N_2 by α, γ, δ, and liquid Fe. (N16, P12, Fe)

52-N. The Transmission of Hydrogen Through Palladium by Electrolysis. H. B. Wahlin and Virgil O. Naumann. *Journal of Applied Physics,* v. 24, Jan. 1953, p. 42-44.

Study of transmission through Pd shows that the area of the surface at which H_2 leaves is the principal controlling factor. Possible applications to hydrogenation studies. Graphs. (N1, Pd)

53-N. Investigation of Crystal Growth by Thermal Etching and Oriented Overgrowth. Alexander Smakula and Myron W. Klein. *Journal of Chemical Physics,* v. 21, Jan. 1953, p. 100-104.

Data on secondary nucleation in single crystals of Tl obtained in connection with annealing. Micrographs. 15 ref. (N2, Tl)

54-N. The Dissociation of H_2 and N_2 on Tungsten Filaments. M. Farber and A. J. Darnell. *Journal of Chemical Physics,* v. 21, Jan. 1953, p. 172-173.

Briefly described. (N15, W)

55-N. Self-Diffusion in the Alkali Metals. D. K. C. MacDonald. *Journal of Chemical Physics,* v. 21, Jan. 1953, p. 177-178.

Brief discussion of measurements using Li, Na, and K. Graphs. 3 ref. (N1, Li, Na, K)

56-N. Aluminum-Oxygen Equilibrium in Liquid Iron. Nev A. Gokcen and John Chipman. *Journal of Metals,* v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 173-178.

Experimental study was made on equilibrium of liquid Fe containing Al and O_2 with a gaseous mixture of H_2 and water vapor, and with crucibles of pure Al_2O_3 from 1695-1866° C. Graphs and tables. 12 ref. (N12, Fe, Al)

57-N. Low Temperature Aging in Titanium Alloys. W. M. Parris, L. L. Hirsch, and P. D. Frost. *Journal of Metals*, v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 197, 1953, p. 178-179.

Work which demonstrates that it is possible to introduce large increases in hardness in certain Ti alloys by heating to 200-300° F. Graphs. (N7, Q29, Ti)

58-N. Attainment of Equilibrium in Gas-Metal Reactions. Nev A. Gokcen. *Journal of Metals*, v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 197, 1953, p. 191-194.

Derives formula expressing minimum time required for establishment of equilibrium and compares calculated values with available data. Graphs and tables. 9 ref. (N16, P12)

59-N. Effect of Carbon on the Volume Fractions and Lattice Parameters of Retained Austenite and Martensite. C. S. Roberts. *Journal of Metals*, v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 197, 1953, p. 203-204.

Brief description. Graphs. 12 ref. (N8, AY)

60-N. Absolute Rate Theory Applied to Rate of Growth of Pearlite. J. H. Frye, Jr., E. E. Stansbury, and D. L. McElroy. *Journal of Metals*, v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 197, 1953, p. 219-224.

Rates of growth of pearlite in high-purity Fe-C alloys were measured as a function of transformation temperature. These and other data were correlated in terms of a derived rate equation. Theoretical implications. Tables and graphs. 19 ref. (N8, Fe)

61-N. Allotropy in the Phase $ZrCr_2$. W. Rostoker. *Journal of Metals*, v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 197, 1953, p. 304.

Specimens of $ZrCr_2$ annealed at 1200, 1100, 994, 900, 834, 800, and 700° C. and subsequently quenched were examined by X-ray diffraction analysis. Tables. (N6, Zr, Cr)

62-N. Occurrence of Chi Phase in Molybdenum-Bearing Stainless Steels. P. K. Koh. *Journal of Metals*, v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 197, 1953, p. 339-343.

Results of some metallographic and X-ray diffraction studies on chi phase as found in several experimental alloys as well as a few Mo-bearing commercial stainless steels. Micrographs and tables. (N8, SS)

63-N. Diffusion Problems Associated With the Growth of Crystals From Dilute Solution. Alfred Seeger. *Philosophical Magazine*, v. 44, Jan. 1953, p. 1-13.

Theoretical investigation of diffusion problem and supersaturation conditions at crystal surface. Tables and diagrams. 7 ref. (N1)

64-N. (French.) Age Hardening of Austenitic and Ferritic Stainless Steels. J. Hochmann. *Revue de Métallurgie*, v. 49, Dec. 1952, p. 849-854.

Reviews age hardening phenomena, particularly of phase precipitation and its effects on mechanical properties and corrosion resistance. (N7, Q general, R general, SS)

65-N. Septum Permeation of Hydrogen From Flames. F. W. Thompson and A. R. Ubbelohde. *Proceedings of the Royal Society*, ser. A, v. 216, Jan. 22, 1953, p. 193-202.

Relative rates of permeation were compared for a $H_2/O_2/N_2$ flame with metal septa consisting of decarburized Cr steel, decarburized Cr/Ni alloy steel, or Ni; and with metal septa consisting of decarburized steel or Ni, when small quantities of SO_2 or H_2S are mixed with $H_2/O_2/N_2$ flame. Diagrams and graphs. (N1, AY, Ni)

66-N. (Pamphlet.) Research and Development of Vapor Deposited Coating for Titanium and Titanium Alloys. Mohammed S. Hyder. Sam Tour & Co., Inc., (New York City), P# 2286, R# 9408, Copy No. 56, Apr. 21, 1952, 24 pages.

Experimental data and results. Micrographs. (N15, L25, Ti)

P

PHYSICAL PROPERTIES AND TEST METHODS

64-P. The Thermal Conductivity of Metals at Low Temperatures. J. L. Olsen and H. M. Rosenberg. *Advances in Physics*, v. 2, Jan. 1953, p. 28-66.

Theory of the electronic thermal conductivity, experimental work on thermal conductivity in the normal state, lattice conductivity, effect of a magnetic field on thermal conductivity, thermal conductivity of superconductors, and experimental techniques. Graphs. 50 ref. (P11)

65-P. On θ Values in Metals. F. M. Kelly and D. K. C. MacDonald. *Canadian Journal of Physics*, v. 31, Jan. 1953, p. 147-164.

Evaluation of Debye characteristic temperature and of characteristic temperature which appears in quantum theory of electrical resistance; compares critically different methods of evaluating them. Data on lighter alkali metals Li, Na, and K are analyzed. Tables and graphs. 33 ref. (P15, M22, Li, Na, K)

66-P. X-Ray Evidence for Metal-to-Metal Bonds in Cupric and Chromous Acetate. J. N. Van Niekerk and F. R. L. Schoening. *Nature*, v. 171, Jan. 3, 1953, p. 36-37.

Brief discussion. (P13)

67-P. Electronic Energy Bands in Metals. G. Parzen. *Physical Review*, ser. 2, v. 89, Jan. 1, 1953, p. 237-243.

Method for calculating energy levels of a crystal is based on finding a variational principle for energy levels in terms of Wannier functions instead of usual Bloch wave functions. Results are compared with results of method of orthogonal plane waves for same problem. (P15)

68-P. The Hall Effect of Copper-Nickel Alloys. Albert I. Schindler and Emerson M. Pugh. *Physical Review*, ser. 2, v. 89, Jan. 1, 1953, p. 295-298.

Ordinary and extraordinary Hall effects were measured at room temperatures for Ni-Cu alloys. Compares results with previous predictions. Graphs. (P15, Cu, Ni)

69-P. Determination of the Surface Energy of a Metal by Molecular Orbitals. G. R. Baldock. *Proceedings of the Physical Society*, v. 66, sec. A, Jan. 1, 1953, p. 2-12.

Electronic binding energy of a monovalent metal is calculated by means of molecular approximation for simple cubic lattice in 1, 2, and 3 dimensions, and for body-centered cubic lattice, in terms of resonance integral β. 16 ref. (P12)

70-P. Thermionic Constants of Metals and Semiconductors II. Metals of the First Transition Group. S. C. Jain and K. S. Krishnan. *Proceedings of the Royal Society*, v. 215, ser. A, Dec. 22, 1952, p. 431-437.

Saturation vapor pressure of electron gas in a graphite chamber at various temperatures and the Clausius-Claperyron thermodynamic relation can be used to determine constants of most metals. Inner walls of graphite chamber were coated with a thick layer of the metal. Data for metals of the Fe group from Ti-Ni are reported. (P15, Ti, V, Cr, Mn, Fe, Co, Ni)

71-P. Magnetostriction. E. W. Lee. *Science Progress*, v. 41, Jan. 1953, p. 58-77.

Theoretical discussion. (P16)

72-P. (French.) The Hall Effect and the Temperature of Ferromagnetic Conductors. J. P. Jan. *Helvetica Physica Acta*, v. 25, Dec. 1952, p. 677-700.

Variation of Hall effect from 190-600° C. was studied for Fe and Ni using a number of variables. Both field and magnetization effects were considered. Theoretical analysis of the data. Results are tabulated and charted. 26 ref. (P15, Ni, Fe)

73-P. (German.) The Optical Constants of Gold and Silver in Ultra-Violet Light. Hermann Kober. *Annalen der Physik*, v. 11, no. 1, 1952, p. 12-14.

A highly sensitive method of measuring optical constants on vapor-deposited Au and Ag reflecters. Data are tabulated. 2 ref. (P17, Au, Ag)

74-P. (German.) Quantum Theory of a New Cause of Ferromagnetism. G. Heber. *Annalen der Physik*, v. 11, no. 1, 1952, p. 48-50.

Mutual effects of the 4*s* and 3*d* electrons in ferromagnetic materials using the spin-wave energies to determine, by static method, spontaneous magnetization and the total energy. 6 ref. (P16, SG-n, p)

75-P. (German.) A Treatise on the Electrochemistry of Active Iron. Jean D'Ans and Wa. Breckheimer. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physicalische Chemie*, v. 56, no. 7, 1952, p. 585-594.

Dependence of Fe potential on concentration of H ions, Fe (II) ions, and anions was investigated. Three relationships were explained by Fe and H_2 acting as an alloy. 21 ref. (P15, Fe)

76-P. (German.) On the Behavior of Electrical Resistance of the Intermetallic Compound Mg_2Pb in the Vicinity of the Melting Point. A. Knappwost. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physicalische Chemie*, v. 56, no. 7, 1952, p. 594-598.

Mg_2Pb showed abnormal decrease of its electrical resistance at the melting point. Explanation was that heteropolar components disappear in favor of metallic bonds. 15 ref. (P15, Mg, Pb)

77-P. (German.) Heats of Formation of Li and Zr Chlorides. H. Siemonsen and U. Siemonsen. *Zeitschrift für Elektrochemie Berichte der Bunsengesellschaft für Physicalische Chemie*, v. 56, no. 7, 1952, p. 643-644.

Heat effect of chlorination of Li and Zr was measured in a calorimetric bomb. The results are compared critically with older values. Refs. (P12, Li, Zr)

78-P. (German.) Formation of Electrochemical Potential at Metal-Electrolyte Interfaces. Wolfgang Lorenz. *Zeitschrift für Naturforschung*, v. 7a, Nov. 1952, p. 750-752.

Different potentials are explained by atoms in deposits with different crystallographic orientations having different bonds to the crystal lattice and to the electrolyte. (P15)

79-P. Surface Properties of Germanium. Walter H. Brattain and John Bardeen. *Bell System Technical Journal*, v. 32, Jan. 1953, p. 1-41.

Contact potential and change of contact potential with illumination of several Ge surfaces were measured. Results are direct evidence for existence of a space charge layer at free surface of a semiconductor. Graphs. 8 ref. (P15, Ge)

80-P. Forces Acting on Superconductors in Magnetic Fields. I. Simon. *Journal of Applied Physics,* v. 24, Jan. 1953, p. 19-24.

Forces acting on a superconducting body in a magnetic field may be obtained by analogy with hydrodynamics, considering similarity of the force field around a perfect diamagnetic with the flow field of an ideal liquid past an impermeable body of the same shape. Two types of magnetic support for a sphere are described. Dissipation of energy in a rotating sphere by eddy currents and by viscous drag of the surrounding gas was studied. Diagrams. 12 ref. (P16)

81-P. Free Surface Properties of Explosive-Driven Metal Plates. R. G. Shreffler and W. E. Deal. *Journal of Applied Physics,* v. 24, Jan. 1953, p. 44-48.

Photographic technique for study of free surfaces under acceleration by high explosives. Methods for reducing the data from the photographic record. Specific results using brass plates driven by Composition B explosive. Photographs and graphs. (P10, Cu)

82-P. Thermionic Emission from Oxide-Coated Tungsten Filaments. C. P. Hadley. *Journal of Applied Physics,* v. 24, Jan. 1953, p. 49-52.

Work included projection tube studies, retarding field measurements, accelerating field measurements, and X-ray diffraction study of the coating. Graphs. 7 ref. (P15, W)

83-P. T^2 Dependence of the Low Temperature Specific Heat of Gallium. Warren De Sorbo. *Journal of Chemical Physics,* v. 21, Jan. 1953, p. 168.

Brief description. Graph. 8 ref. (P12, Ga)

84-P. Determination of the Absolute Grain Boundary Energy of Gold at 1300° K. F. H. Buttner, H. Udin, and J. Wulff. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 313-317.

Introduces a method whereby general grain boundary energy of metals in equilibrium at high temperatures can be found, assuming average surface energy of material is known for the same temperature. Diagrams. 37 ref. (P12, Au)

85-P. The Electrical Resistances of Alloys of a Noble Metal and a Transition Metal. A. N. Gerritsen and J. O. Linde. *Physica,* v. 18, Nov. 1952, p. 877-890.

Analysis of change of resistivity per atom per cent solute as a function of temperature underlines similarity among binary alloys with Mn and Cr as a second component in comparison with Zn as a solute. Results indicate that anomalous behavior is characteristic for contamination of a noble metal by a transition metal. Tables and graphs. 23 ref. (P15, Mn, Cr, Zn)

86-P. Neutron Capture γ-Rays From Titanium, Chromium, Iron, Nickel, and Zinc. B. B. Kinsey and G. A. Bartholomew. *Physical Review,* ser. 2, v. 89, Jan. 15, 1952, p. 375-385.

Neutron capture γ-rays emitted by even-charge elements, from Ti to Zn, have been investigated with aid of a pair spectrometer. Graphs and tables. 27 ref. (P13, Ti, Cr, Fe, Ni, Zn)

87-P. Neutron Capture γ-Rays From Scandium, Vanadium, Manganese, Cobalt, and Copper. G. A. Bartholomew and B. B. Kinsey. *Physical Review,* ser. 2, v. 89, Jan. 15, 1953, p. 386-395.

More detailed pair spectrometer measurements of neutron capture γ-rays produced by Sc, V, Mn, Co, and Cu were made. Tables and graphs. 34 ref. (P13, Sc, V, Mn, Co, Cu)

88-P. Collective Electron Ferromagnetism. A Generalization of the Treatment and an Analysis of Experimental Results. K. L. Hunt. *Proceedings of the Royal Society,* ser. A, v. 216, Jan. 7, 1953, p. 103-117.

Detailed comparison with experiment of temperature variation of electronic specific heat, spontaneous magnetization, and magnetocaloric temperature change accompanying changes in external field. Ni, Ni-Co, and Ni-Cu alloys were used. Graphs. 14 ref. (P16, Ni, Co, Cu)

89-P. Some Magnetic Properties of Metals. V. Magnetic Behavior of a Cylindrical System of Electrons for all Magnetic Fields. R. B. Dingle. *Proceedings of the Royal Society,* ser. A, v. 216, Jan. 7, 1953, p. 118-142.

Wentzel-Kramers-Brillouin method is used to solve Schrödinger equation for an electron moving in a uniform magnetic field, boundary of system being a cylinder with its axis lying along direction of field. Steady (nonperiodic) contributions to magnetic susceptibility are derived for all fields in both low and high-temperature limits, and for most fields at intermediate temperatures. 7 ref. (P16)

90-P. Induction and Dielectric Heating. Physical Constants of Metals. *Welding Engineer,* v. 38, Feb. 1953, p. 51.

Tabulated information. (P11, P15)

91-P. (French.) **The Influence of Oxygen in Solid Solution in High Purity Iron on Certain Magnetic Properties in Weak Alternating Fields.** Jean Bourrat, Georges Chaudron, and Israel Epelboin. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences,* v. 235, Nov. 24, 1952, p. 1290-1292.

Experimental arrangement and results of magnetic measurements on four irons, annealed under pure and dry electrolytic H_2. Data are charted. (P16, Fe)

92-P. (French.) **Contribution to the Study of Pyrophoric Metals. The Oxidation of Cerium and Uranium Metals. Part I.** Jean Loriers. *Revue de Metallurgie,* v. 49, Nov. 1952, p. 801-810; Dec. 1952, p. 883-905.

Relation between pyrophoricity of metals and their ignition points. A study was also made of Ce oxidation and the nature and structure of the oxidation products. 97 ref. (P11, Ce, U)

93-P. (French.) **Thermodynamic Calculations on the Nature of Guimer-Preston Zones in Al-Cu Alloys.** J. L. Meijering. *Revue de Métallurgie,* v. 49, Dec. 1952, p. 906-910.

Theoretical calculations are compared with experimental data. 15 ref. (P12, Al, Cu)

94-P. Magnetic Properties Below 1° K. D. de Klerk. *Physics Today,* v. 6, Feb. 1953, p. 4-9.

Magnetic properties found in some metallic salts showing Curie points at very low temperatures (below 1° K.). 16 ref. (P16, Fe)

95-P. (English.) **The Paramagnetic Susceptibility of AuFe Alloys.** Ebbe Kronqvist. *Arkiv för Fysik,* v. 5, no. 5-6, 1952, p. 453-458.

Theoretical discussion. (P16, Au, Fe)

96-P. (English.) **On the Emission of Sound Waves From an Electron in a Metal and the Theory of Superconductivity.** O. Klein. *Arkiv för Fysik,* v. 5, no. 5-6, 1952, p. 459-469.

Theoretical discussion. (P15)

97-P. (Book.) **Bibliography and Abstracts on Electrical Contacts. 1835-1951. Ed. 2.** 266 pages. Nov. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $5.50.

Bibliography to develop standards for electrical contact materials and to determine effect of variables upon performance. Includes articles on contact materials, methods of testing and on interruption of electrical circuits. Over 1500 references, hundreds of abstracts, and many special articles. (P15, T1, SG-r)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

122-Q. Strength Tests by Towing in Water. Winfried Braun. *Aircraft Engineering,* v. 25, Jan. 1953, p. 22-25.

Aircraft components were towed under water in a large tank so that loads were produced on specimen equivalent to those realized under actual flight conditions. Advantages of method were that no special means for transmitting forces to specimen were needed and that all changes of air loads resulting from elastic deformation were automatically included in applied loading. Diagrams and graphs. (Q23)

123-Q. Creep Resisting Ferritic Steels for Gas Turbines. H. W. Kirkby. *Alloy Metals Review,* v. 8, Dec. 1952, p. 2-6.

Properties of existing creep resisting ferritic steels, Mo-V steel and 3% Cr-Mo-W-V steel, are reviewed in relation to possible industrial gas turbine applications. Discussion is confined to materials for turbine disks or rotors and turbine blades. Graphs and tables. 9 ref. (Q3, T25, AY)

124-Q. An Inquiry Into the Reproducibility of Impact Test Results. H. L. Fry. *ASTM Bulletin,* Jan. 1953, p. 61-64; disc., p. 64-66.

Previously abstracted from American Society for Testing Materials, Preprint 67; see item 619-Q, 1952. (Q6, CN, AY)

125-Q. A Routine Method for the Measurement of Residual Stresses in Plates. R. G. Boiten and W. Ten Cate. *Applied Scientific Research,* sec. A, v. 3, 1952, p. 317-343.

Modification of "drill-hole" method of Mathar and Soete. Theoretical relations governing problem are derived and compared with test results. (Q25)

126-Q. Properties of Some High-Aluminum Zinc-Base Die Casting Alloys. O. A. Carson. *Canadian Mining and Metallurgical Bulletin,* v. 46, Jan. 1953, p. 13-16; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 56, 1953, p. 1-4.

Investigation to determine tensile, impact and hardness data. (Q27, Q29, Q6, Zn)

127-Q. Photo-Elastic Research on Plates in Transverse Bending. Albrecht Kuske. *Engineering,* v. 175, Jan. 2, 1953, p. 20-21; Jan. 9, 1953, p. 36-39.

New method and some results obtained by using it. Photographs of stress patterns, and diagrams. (Q25)

128-Q. Tests on Small Triangulated Steel Frames. R. W. Steed. *Engineering,* v. 175, Jan. 9, 1953, p. 52-53.

Electrical resistance strain gages were used in conjunction with

Wheatstone bridge to measure strains in above frames which were loaded in an Avery testing machine. Photographs and diagrams. (Q25, ST)

129-Q. Testing Nuts and Bolts for Resistance to Vibration. *Engineering*, v. 175, Jan. 9, 1953, p. 54-55.

Design and use of the machine developed by Lester Lock Nut and Washer Co. Ltd., Wordsley, Staffordshire. (Q9)

130-Q. Creep Properties of Steels for Power Plants. I. A. E. Johnson and N. E. Frost. *Engineering*, v. 175, Jan. 2, 1953, p. 25-28; Jan. 9, 1953, p. 58-60.

Tests and results of using carbon steel, Mo steel, and Mo-V steel to examine effects of practically possible fluctuations of stress and temperature on creep properties. Tables and graphs. (Q3, CN, AY)

131-Q. Evolution of Engineering and High-Strength Irons. M. Ballay. *Foundry Trade Journal*, v. 94, Jan. 8, 1953, p. 41-45.

Mechanical properties of unalloyed gray irons and alloyed cast irons; methods of heat treatment; cast irons with spheroidal graphite; corrosion resisting and special-duty cast iron; and resistance to wear and friction. (Q general, J general, CI)

132-Q. Deformation by Transformation Makes Alloys Tougher. E. S. Machlin. *Iron Age*, v. 171, Jan. 22, 1953, p. 106-109.

Deformation by cold working or applying stress increases mechanical properties of most malleable metals. By applying strain through phase transformation more deformation can be accomplished in shorter time which decreased notch sensitivity and increased impact resistance. Austenitic steels, stainless steel, and Ti alloy are discussed. Graphs, diagrams, and micrographs. 4 ref. (Q24, N8, SS, AY, Ti)

133-Q. Creep at 250° and 300° C. of Some Magnesium Alloys Containing Cerium. G. A. Mellor and R. W. Ridley. *Journal of the Institute of Metals*, v. 81, Jan. 1953, p. 245-253.

Experimental data and results. Graphs, tables, and micrographs. (Q3, Mg)

134-Q. The Experimental Production of Small Tensile Specimens by Electrolytic Solution (Electro-Turning). M. H. Farmer and G. H. Glaysher. *Journal of Scientific Instruments*, v. 30, Jan. 1952, p. 9-10.

Production of both parallel gage lengths and grooves in uniform round bar material by electro-turning is practicable, and leaves a surface essentially free from machining deformation. Method should be useful in research on very hard and very soft metals, and on single metallic crystals. Cu and Fe were used in experiments. (Q27, G17, Cu, Fe)

135-Q. Galling and Seizing Characteristics of Titanium and Titanium-Base Alloys. *Mechanical Engineering Department, Carnegie Institute of Technology*, Interim Technical Report 1, Oct. 15, 1951-Apr. 15, 1952, 14 pages.

Importance of area of contact, normal load, roughness, adhesion, adsorbed films, and temperature in friction and seizing. (Q9, Ti)

136-Q. Galling and Seizing Characteristics of Titanium and Titanium-Base Alloys. William C. Leone. *Mechanical Engineering Department, Carnegie Institute of Technology*, Interim Technical Report 2, Apr. 15, 1952—Oct. 15, 1952, 16 pages.

Equipment for doing experimental work on friction characteristics for various loads and speeds. Results of tests. (Q9, Ti)

137-Q. Creep of Non-Ferrous Metals. K. Löhberg. *Metal Industry*, v. 82, Jan. 2, 1953, p. 3-6.

Previously abstracted from *Metall*; see item 859-Q, 1952. (Q3, Pb, Cu, Al, Mg, Zn)

138-Q. The Determination of the Energy Stored in a Metal During Plastic Deformation. L. M. Clarebrough, M. E. Hargreaves, D. Michell, and G. W. West. *Proceedings of the Royal Society*, ser. A, v. 215, Dec. 22, 1952, p. 507-524.

New apparatus for measurement of stored energy and results obtained. Results for specimens of electrolytic Cu deformed in torsion show that stored energy increases with deformation in a similar way to torque required to produce deformation. Diagrams and graphs. 9 ref. (Q24, Cu)

139-Q. A Study of the Practical Efficiency Under Static Loading of Riveted Joints Connecting Plates. W. M. Wilson, W. H. Munse, and M. A. Cayci. *University of Illinois Engineering Experiment Station*, Bulletin Series No. 402, July 1952, 75 pages, (v. 49, No. 78).

Comprehensive description of tests. Graphs and tables. (Q23, K13, ST)

140-Q. The Effect of Chromium Plating on the Endurance Limit of 4340 Steel. George M. Cabble, Jr. *Virginia Polytechnic Institute Engineering Experiment Station*, Series No. 82, Nov. 1952, 20 pages, (v. 66, No. 1).

Effect was determined by rotating beam fatigue tests on five groups of specimens: 4340 steel not plated, plated once, plated once and baked once, plated twice, and plated twice and baked twice. (Q7, L17, AY)

141-Q. Evaluation of Brittle Failure Research. E. F. Sweeney. *Welding Journal*, v. 32, Jan. 1953, p. 1s-13s.

Transition temperatures for various specimens and criteria, and their significance. Old and new ABS steels are compared, including plates in which service failures originated. Tables and graphs. (Q23, CN)

142-Q. Factors Affecting Resistance of Pressure Vessel Steels to Repeated Overloading. J. H. Gross, S. Tsang, and R. D. Stout. *Welding Journal*, v. 32, Jan. 1953, p. 23s-30s.

Biaxial fatigue studies in plastic range with zero to tension vs. reversed bending; effect of surface stress raisers, preheating, postheating and use of low-alloy steels. (Q7, AY)

143-Q. Fatigue Tests of Steel Girders. Hans Bühler. *Welding Journal*, v. 32, Jan. 1953, p. 52s-54s. (From *Stahl und Eisen*, v. 72, 1952, p. 1035-1037.)

Data are tabulated and graphed. (Q7, AY)

144-Q. (French.) **Influence of the Fatigue Phenomenon on the Modulus of Elasticity of Steels.** Andre Kovacs and Pierre Laurent. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences*, v. 235, Nov. 10, 1952, p. 1103-1104.

No change of the modulus was observed during tests on Ni-Cr structural steel. (Q21, AY)

145-Q. (French.) **Influence of Fatigue on the Magnetic Properties of Steels.** Andre Kovacs and Pierre Laurent. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences*, v. 235, Nov. 17, 1952, p. 1224-1226.

Effects of repeated stresses on magnetic permeability. Tests were made on nickel-chromium structural steel. Data are charted. (Q7, P16, AY)

146-Q. (French.) **The Deformation and Polygonization of Aluminum Monocrystals.** Honoré Lambot and Lawrence Vassamillet. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences*, v. 235, Nov. 17, 1952, p. 1232-1234.

Application of X-ray transmission to study of modifications occurring in metals during various mechanical and thermal treatments. Results are discussed. (Q24, M22, Al)

147-Q. (French.) **Results of Some Measurements on Nimy-Maisieres Bridge Beams.** V. Degreef and A. Soete. *L'Ossature Metallique*, v. 17, Nov. 1952, p. 553-559.

Strain-gage measurements, apparatus used, static and dynamic tests, and variations of testing for different parts of the bridge. (Q25, T26, ST)

148-Q. (French.) **The Resistance to Fatigue, or Endurance.** R. Cazaud. *Métaux Corrosion—Industries*, v. 27, Oct. 1952, p. 386-400.

Reviews literature. Causes of fatigue, endurance limit, endurance tests, numerical values for endurance limit, and influence of various factors upon endurance. Tables, charts, diagrams. 9 ref. (Q7)

149-Q. (French.) **How to Determine Internal Stresses in Bars and Tubes by the Saches Drilling Method.** Hans Bühler and Walter Schreiber. *Métaux Corrosion—Industries*, v. 27, Oct. 1952, p. 414-419.

Equations for calculations are derived. Transformed approximation equations are suggested as a time-saving aid. Examples of applications. 13 ref. (Q25)

150-Q. (German.) **Cup-Drawing Test Procedure for Determining the Deep-Drawing Properties of Sheet and Strip.** H. Beisswanger. *Metall*, v. 6, Dec. 1952, p. 744-753.

The Erichson test is shown to be less satisfactory for evaluating drawing properties than the cup-drawing test. 19 ref. (Q23, G4, CN, SS, Cu, Al)

151-Q. (German.) **Hypotheses on the Influence of Size and Form Upon Dynamic Fatigue Stress.** A. Troost. *Metall*, v. 6, Dec. 1952, p. 756-762.

Best-known hypotheses were investigated and compared with obstruction to plastic deformation hypothesis. All hypotheses observed can be presented as special cases of the obstruction hypothesis. 56 ref. (Q7)

152-Q. (German.) **Changes in the Concept of Permanent Deformation.** W. Engelhardt. *Metall*, v. 6, Dec. 1952, p. 762-764.

Studies on "spontaneous expansion" have caused a change in the concept of permanent deformation. It is now considered as being purely mechanical with a thermal component instead of a thermodynamic process. (Q24, P12)

153-Q. Creep of Steel at Room Temperature Under Static Load. W. Jäniche and G. Thiel. Henry Brutcher, Translation 2945, 3 pages.

Previously abstracted from *Archiv für das Eisenhüttenwesen*. See item 363-Q, 1950. (Q3, CN)

154-Q. The Propagation of Fractures in Mild-Steel Plates. G. Murray Boyd. *Engineering*, v. 175, Jan. 16, 1953, p. 65-69; Jan. 23, 1953, p. 100-102.

Propagation of fractures in wide plates on the basis of simple assumptions in terms of mechanical concepts. Does not include theories of ordinary concepts of stress and strain. Diagrams, photographs, and micrographs. 27 ref. (Q26, CN)

155-Q. Foil Strain Gauges for Torque and Pressure Measurement. *Engineering*, v. 175, Jan. 23, 1953, p. 119.

Brief description. (Q25)

156-Q. Working Stresses and Working Strength of Spur Gears. A. Thum and K. Richard. *Engineers' Digest*, v. 14, Jan. 1953, p. 9-12.

Previously abstracted from *Schweizer Archiv für Angewandte Wissenschaft und Technik*. See item 87-Q, 1953. (Q25, ST)

157-Q. (French.) **Thermal Properties of 2.2% Cr and 1% Mo Steel for Use**

in Steam Superheated to Around 550° C. P. Cattier. *Fourth International Congress on Industrial Heating* (Paris), 1952, no. 5, 10 pages.

Includes micrographs, tables, and charts. (Q general, AY)

158-Q. (French.) **Creep Tests and Extrapolation of Their Results to Long-Time Tests.** W. Siegfried. *Fourth International Congress on Industrial Heating* (Paris), 1952, no. 145, 19 pages.

A detailed study was made of the relation between actual stress and rate of flow in long-time tests. Relationships between theoretical and experimental stress-rupture values are discussed. (Q3)

159-Q. (French.) **Prior Cold Work and Mechanical Strength of the Austenitic Stainless Steels at Elevated Temperatures.** Rene Castro, Andre Gueussier, and J. de Lacombe. *Fourth International Congress on Industrial Heating* (Paris), 1952, no. 180, 11 pages.

Influence of C, Mo, W and Ti on resistance of 18-8 to softening after cold working. Parallelism between the mechanical behavior at high temperature and resistance to softening after cold working; theoretical and practical conclusions. Establishes critical duration of loading or critical temperature beyond which the favorable effect of the cold work disappears. (Q23, Q24, SS)

160-Q. Ductile Iron. Watch Copper Buildup. J. C. Neemes. *Iron Age,* v. 171, Feb. 5, 1953, p. 162-164.

Small amounts of Cu increase strength and hardness, and reduces ductility in the as-cast condition. Advantages, disadvantages and how the latter may be improved. (Q23, CI, Cu)

161-Q. The Elastic Constants of Cu —4 Percent Si. Charles S. Smith and J. W. Burns. *Journal of Applied Physics,* v. 24, Jan. 1953, p. 15-18.

Fundamental shear constants of this alloy and of 28% Zn copper alloy are analyzed in terms of the electrostatic and ionic contributions to the shear stiffness of pure Cu. 9 ref. (Q21, Cu)

162-Q. X-Ray Study of Cold Work in Thoriated Tungsten. M. McKeehan and B. E. Warren. *Journal of Applied Physics,* v. 24, Jan. 1953, p. 52-56.

Experiments using powder samples prepared from sintered and swaged W rods. 6 ref. (Q24, H general, W)

163-Q. The Initial Yield in Iron. H. W. Paxton. *Journal of Applied Physics,* v. 24, Jan. 1953, p. 104-105.

Series of experiments previously made on single crystals and polycrystals of Fe, and different explanations for the similar behavior. Graphs. 5 ref. (Q23, Fe)

164-Q. The Notched Slow-Bend Test as a Brittle-Fracture Test. J. E. de Graaf and J. H. van der Veen. *Journal of the Iron and Steel Institute,* v. 173; Jan. 1953, p. 19-30.

Experiments that led to choice of a 3-mm. deep pressed notch in standard test, and, in addition, experience with deeper notches, especially in regard to conditions affecting arrest of crystalline fracture, are discussed. Phenomena at root of notch up to start of incipient fracture, and those related to strain distribution in bending. Graphs. (Q5, CN)

165-Q. Effect of Tensile Strain at Low Temperatures on Deformation Twinning in Ingot Iron. Glenn W. Geil and Nesbit L. Carwile. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 213-217.

Metallographic study was made of deformation twinning (Neumann lamellae) in ingot iron slowly deformed in tension at −196 and −150° C. Micrographs. 6 ref. (Q24, Fe)

166-Q. Slip and Grain Boundary Sliding as Affected by Grain Size. Nicholas J. Grant, Italo S. Servi, and Arup Chaudhuri. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 217-218.

Experiments in which 2S Al was used. Micrographs. (Q24, Al)

167-Q. Mechanism of Plastic Flow in Titanium. Determination of Slip and Twinning Elements. F. D. Rosi, C. A. Dube, and B H. Alexander. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 257-265.

Slip and twinning elements were determined in deformed coarse crystals of arc-melted 99.77% Ti. Method of identification was based on use of stereographic plot of a back-reflection Laue photograph describing region where slip and twinning were observed. Diagrams and micrographs. 24 ref. (Q24, Ti)

168-Q. Mechanical Properties of High Purity Ti-Al Alloys. H. R. Ogden, D. J. Maykuth, W. L. Finlay, and R. I. Jaffee. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 267-272.

Methods of investigation, fabricating and annealing characteristics, physical properties, mechanical properties, effects of heat treatment, weldability, density, and air oxidation. Graphs and tables. 4 ref. (Q general, J general, P general, K9, Ti, Al)

169-Q. Kinetics of Thermal Reorientations in Cold Rolled Zirconium. R. K. McGeary and B. Lustman. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 284-291.

Orientation relationships and rates of annealing of 97% cold rolled Zr were studied by X-ray techniques, metallography, and hardness measurements. Process of annealing occurring by formation of domains, and their subsequent growth without recrystallization. Diagrams and graphs. 27 ref. (Q24, Zr)

170-Q. Cold-Rolling and Annealing Textures of Molybdenum Single Crystals. N. K. Chen and R. Maddin. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 300-304.

Single crystals of Mo were deformed by rolling with respect to specific crystallographic planes and directions. Annealing treatments were carried out after deformation to study recrystallization characteristics as well as recrystallization texture. Diagrams. 10 ref. (Q24, N5, Mo)

171-Q. Grain Boundary Sliding and Migration and Intercrystalline Failure Under Creep Conditions. Hsing C. Chang and Nicholas J. Grant. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 305-312.

Creep of coarse-grained high-purity Al was studied at 400-1100° F. with an initial stress range of 50-1200 psi. Process of boundary sliding and migration. Theory regarding role the grain boundaries play under creep conditions. Diagrams and micrographs. (Q3, Al)

172-Q. Nature of the Creep Curve. Thomas H. Hazlett and Earl R. Parker. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 318-323.

Ni was selected as base material for investigation and an experimental program was initiated to determine effects of temperature and stress on creep characteristics. Graphs. 8 ref. (Q3, Ni)

173-Q. Some Observations on Correlations Between the Creep Behavior and the Resulting Structures in Alpha Solid Solutions. Oleg D. Sherby and John E. Dorn. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 324-330.

Correlates creep properties of dilute α solid solutions in Al with subgrain structures that are developed during creep. Micrographs, graphs, and photographs. 11 ref. (Q3, M27, Al)

174-Q. Creep Properties of Commercially Pure Titanium. W. R. Kiessel and M. J. Sinnott. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 331-338.

Creep characteristics of Ti sheet in annealed state, cold worked state, and cold worked and recovered state in 75-750° F. range were determined. Effect of strain aging on creep, and possible explanation for poor creep properties of Ti. Graphs. 20 ref. (Q3, Ti)

175-Q. Development of Mechanical and Magnetic Hardness in a 10 Pct V-Co-Fe Alloy. Richard W. Fountain and Joseph F. Libsch. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 349-356.

Experimental procedure, thermal analysis measurements, X-ray diffraction analysis, hardness and electrical resistivity measurements, magnetic properties, and correlation of structure and mechanical hardness. 11 ref. (Q29, P16, V, Co, Fe)

176-Q. Design Criterion for Fatigue of Wings. P. B. Walker. *Journal of the Royal Aeronautical Society,* v. 57, Jan. 1953, p. 12-18.

Results of tests to achieve consistency for a diversity of operating conditions, and a variety of aircraft types. (Q7, T24)

177-Q. A Method of Measuring Post-Yield Strain. F. J. Woodcock and K. R. Weiss. *Journal of the Royal Aeronautical Society,* v. 57, Jan. 1953, p. 49-51.

Use of Cu-Ni wire strain gages. Diagrams. 5 ref. (Q25, Q27, Ni, Cu)

178-Q. Strong, Heat Resistant Alloys and Metallic Combinations. Andre Michel. *Metal Progress,* v. 63, Jan. 1953, p. 120-124.

Advantages and disadvantages of ferritic vs. austenitic steels regarding creep resistance. Powder metallurgy and cermet developments are surveyed. (Q3, Q general, H general, AY, SS)

179-Q. A Theoretical Examination of the Plastic Deformation of Crystals by Glide. J. F. W. Bishop. *Philosophical Magazine,* v. 44, Jan. 1953, p. 51-64.

Proofs are given of theorems stated in Bishop-Hill theory of crystal distortion. Mathematical relations are established for deformation of crystals by simultaneous shears, and possibility of enforcing an arbitrary strain by glide is examined. Uniform stress states not exceeding critical shear stresses in glide directions are discussed, and a geometrical picture of stress and strain states is developed. Diagrams. 4 ref. (Q24)

180-Q. The Structure of Deformation Bands. Edward W. Hart. *Physical Review,* ser. 2, v. 89, Jan. 15, 1952, p. 521-522.

Shows that, if components of parallel pairs were edge type dislocations, such a group could form a stable array and this array would have a property which has been observed for deformation bands in metal crystals deformed in tension. Diagrams. 3 ref. (Q24, M26)

181-Q. Apparatus for Measuring Internal Friction in Transversely Vibrating Metal Reeds. W. R. Jewell. *Review of Scientific Instruments,* v. 24, Jan. 1953, p. 5-10.

Includes description of a symmetrical transducer for inducing vibrations and an optical method of observing amplitude. Measurements can be made while nonferromagnetic reed is temperature controlled and vibrating in a vacuum. Diagrams. 2 ref. (Q22)

182-Q. (French.) **Effect of Hydrogen on the Characteristics of Deformation and Rupture of Iron and Steel in Tension.** *Revue de Métallurgie,* v. 49, Dec. 1952, p. 837-848.

A study was made of effects of H_2 introduced at room temperature on slip, technical cohesive strength, and brittleness. Data are tabulated and charted. 16 ref. (Q27, Fe, CN)

183-Q. (French.) **The Mechanical Properties and the Suitability for Cold Working of Improved Basic Bessemer Steel.** R. Langers, H. Herbiet, and F. Montbrun. *Revue Universelle des Mines, de la metallurgie des Travaux Publics, des Sciences et des Arts Appliques a l'Industrie,* ser. 9, v. 8, Nov. 1952, p. 438-450.

Previously abstracted from 4th International Mechanical Engineering Congress, June 1952. See item 921-Q, 1952.

184-Q. (Dutch.) **Electron Microscope Investigation of Metal Surfaces. II. Adaptations for Metal Research.** D. A. Beekhuis and J. A. Schuchmann. *Metalen,* v. 7, Dec. 31, 1952, p. 444-458.

Results of electron microscope in wear tests and on concrete reinforcing wire. 25 ref.
(Q9, M21, Cu, Al, CI, ST)

185-Q. Wear Properties of Ductile Cast Iron. *Product Engineering,* v. 24, Feb. 1953, p. 125-127.

Laboratory tests and use of Fe in piston rings, cylinders, gears, dies, and bearings. Photographs, tables, and graphs. (Q9, CI)

186-Q. Relation of Preheating to Embrittlement and Microcracking in Mild Steel Welds. A. E. Flanigan and T. Micleu. *Welding Journal,* v. 32, Feb. 1953, p. 99s-106s.

Extension of studies concerned with a type of embrittlement affecting mild steel arc welds which are allowed to cool too rapidly through low-temperature range following welding. Limited principally to considerations of weld metal behavior. (Q23, K1, CI)

187-Q. Fatigue Tests on Defective Butt Welds. W. G. Warren. *Welding Research,* v. 6, Dec. 1952, p. 112r-117r.

Tests on mild steel plates. Details of the investigation. Tables and X-radiographs. (Q7, CN)

188-Q. (Book.) **Analytic Mechanics. Ed. 3.** V. M. Faires and S. D. Chambers. 608 pages. 1952. Macmillan Co., 60 Fifth Ave., New York 11, N. Y. $5.50.

Covers force analysis of statically determinate structures with emphasis on free body method of analysis. New additions include more problems and examples, 247 new line drawings; numerous biographical and historical sketches; chapter on vibrations; new topics on gyroscopic action, dimensional analysis, and common mathematical relations.
(Q general)

189-Q. (Pamphlet.) **Developments Concerning the Properties of Cast Steels.** Charles W. Briggs. Steel Founders' Society of America (Cleveland), Nov. 1952, 19 pages.

Hardenability, time-temperature-transformation curves, and austenite grain size of cast steel. Also information on heat treatments. Graphs, tables, and micrographs.
(Q general, J26, M27, N8, CI)

190-Q. (Book.) **Fatigue of Metals. Ed. 3.** R. Cazaud. A. J. Fenner, translator. 1953. Chapman & Hall, Ltd., 37-39 Essex St., London, W. C. 2. £3-0-0.

Translated from the French. Of particular interest to airplane workers and designers. Includes historical background, characteristics of fatigue failures, fatigue tests and testing machines, and influence of surface conditions. (Q7)

191-Q. (Book.) **Mechanics of Materials.** Alvin Sloan. 416 pages. 1952. Macmillan Co., 60 Fifth Ave., New York 11, N. Y. $5.00.

Establishes as central theme basic flexure theory, with longitudinal shear, deflection, and other concepts treated as natural corollaries. Mohr's circle is built in as a basis of analysis throughout, and is applied to strain and to moments of inertia. Simplified presentation of true stress, torsion of thin shells, shear centers, curved beam, and application of failure theories in combined loading are also included.
(Q general)

192-Q. (Book) **Metal Data Ed. 2.** Samuel L. Hoyt. 526 pages. 1952. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. $10.00.

Revised edition of "Metals and Alloys Data Book". Bulk of material is offered in nearly 700 tables and graphs with a minimum of descriptive text. Information on such metallic properties as tensile strength; hardenability; thermal expansion; creep strength; endurance limit and yield strength at normal, subnormal, and elevated temperatures; and for various conditions of mechanical treatment. Special features include a listing of commonly used test bars, hardness tests, corrosion data, conversion factors, applications of materials and properties of elements. (Q general)

193-Q. (Pamphlet.) **Some Mechanical Properties of Cast Steels.** Steel Founders' Society of America (Cleveland), Nov. 1952, 15 pages.

Response of cast steels to various heat treatments, plus effects of adding alloys to plain carbon cast steels.
(Q general, J general, CI)

R

CORROSION

59-R. The General Motors Research Corrosion Test: A Cyclic Humidity Accelerated Corrosion Test for Sheet Steel. A. J. Opinsky, R. F. Thomson, and A. L. Boegehold. *ASTM Bulletin,* Jan. 1953, p. 47-51; disc., p. 51-53.

New type of precision corrosion test was developed to study corrosion resistances of bare steel specimens for those applications where protective rust of specimens exposed on racks outdoors is not fully realized. Diagrams and graphs.
(R11, ST)

60-R. Lead and Lead Alloys. Kempton H. Roll. *Chemical Engineering,* v. 60, Feb. 1953, p. 264, 266, 268, 270, 272, 274, 276, 278, 280.

Corrosion resistant Pb alloys in various forms. Charts illustrate resistance to certain chemicals.
(R general, Pb)

61-R. Economics of Corrosion Control for Gas Distribution Systems. A. W. Peabody. *Gas,* v. 29, Jan. 1953, p. 51-53, 58.

General discussion. (R9, CI, CN)

62-R. The Corrosion of Mild Steel and Brass in Chlorinated Water. F. Wormwell and T. J. Nurse. *Journal of Applied Chemistry,* v. 2, Dec. 1952, p. 685-692.

Specially designed apparatus is considered to be generally suited for experiments in flowing waters. Results in relation to effect of chlorination, rate of flow, period of test, and temperature. Tables and photographs. (R4, CN, Cu)

63-R. High-Temperature Oxidation Characteristics of a Group of Oxidation-Resistant Copper-Base Alloys. J. P. Dennison and A. Preece. *Journal of the Institute of Metals,* v. 81, Jan. 1953, p. 229-234.

Influence of small separate additions of Al, Be, Cr, Mg, and Si on high-temperature oxidation of Cu. Composition and microstructure of scales formed were studied and correlated with rates of oxidation. Micrographs and graphs. (R2, Cu)

64-R. The Effect of Cold Work on the Microstructure and Corrosion-Resistance of Aluminium-5% Magnesium Alloys Containing 0-1% Zinc. P. Brenner and G. J. Metcalfe. *Journal of the Institute of Metals,* v. 81, Jan. 1953, p. 261-268.

Experimental data show that presence of Zn has little effect on mechanical properties, but alloy containing 1% Zn shows pronounced precipitation after aging at 70° C., and corrosion attack is greater than in case of 0-0.5% Zn alloys. Explanations of corrosion behavior. Graphs and micrographs. (R2, M27, Q24, Mg)

65-R. Galvanic Corrosion. *Materials & Methods,* v. 37, Jan. 1953, p. 119.

Tabulated information on galvanic series in sea water, with brief explanations of the series, anode and cathode areas, and preventing galvanic corrosion. (R1)

66-R. (French.) **Mechanism of the Effect of Ionized Solutions of Hydrogen Suflide on Iron and Steel.** Paul Bastien and Pierre Amiot. *Comptes Rendus Hebdomadaires des Seances de l'Academie des Sciences,* v. 235, Nov. 3, 1952, p. 1031-1033.

Experimental results show that brittleness and fracture resulting from contact of Fe and steel with H_2S are due to H_2 penetration.
(R2, Fe, CN)

67-R. (French.) **Decohesion and Stress-Corrosion of Nonferrous Metals.** J. Herenguel. *Métaux Corrosion—Industries,* v. 27, Oct. 1952, p. 379-385.

Various mechanisms which make possible localization of attack at grain boundaries. Nature and origin of mechanical stresses, difference of corrosion in various alloys, and decohesion under mechanical stress. Micrographs. 15 ref. (R1)

68-R. (German.) **Why Condenser Tubes of Brass?** Max Werner. *Brennstoff-Wärme-Kraft,* v. 4, Nov. 1952, p. 367-371.

Suggestion is made to replace brass entirely by pure Cu or bronzes, the slight increase of price being far outweighed by advantages.
(R4, T27, Cu)

69-R. (German.) **Corrosion Problems of Gas-Piping Systems.** Walter Haurin. *Das Gas-und Wasserfach,* v. 93, Nov. 1, 1952, p. 609-611.

Causes of corrosion, both external and internal. 20 ref.
(R9, R3, CN)

70-R. (Norwegian.) **Blade Problems and Protection Against Corrosion in Water Turbines.** A. B. Winterbottom. *Teknisk Ukeblad,* v. 99, Oct. 23, 1952, p. 802-805.

Effect of vibrations and corrosion fatigue on ship-turbine blades made of Cr stainless steels. Data are graphed. 9 ref. (R1, SS)

71-R. Increase in Corrosion Resistance of Phosphate Coatings Upon Subsequent Treatment With Pore-Filling Substances. W. Machu. Henry Brutcher, Translation 2884, 25 pages.

Previously abstracted from *Archiv für Metallkunde.* See item 48-L, 1950. (R10, L14, CN)

72-R. Corrosion of Stainless. David R. Keck. *Canadian Chemical Processing,* v. 37, Jan. 1953, p. 40, 42.

Corrosion types, causes, and reduction by materials and process control. (R1, R2, SS)

73-R. The Corrosion of Domestic Galvanized Hot Water Storage Tanks. I. Laird Newell. *Corrosion,* v. 9, Feb. 1953, p. 46-51.

Factors which lead to Zn becoming cathodic to steel in hot water tanks. Instances pointing to presence of Cu as being a principal agent in rapid dissolution of Zn protective coatings exposed to heated H_2O. Tables, diagrams, and micrographs. (R4, Zn, Cu, CN)

74-R. Economic Aspects of Cathodic Protection. Ray M. Wainwright. *Corrosion,* v. 9, Feb. 1953, p. 51-55.

For pipeline example annual corrosion costs may be from 2-5% of original investment. By proper corrosion control these costs may be replaced by coating and cathodic protection costs which are only 1-2% of original investment. Graphs. (R10)

75-R. The Coupon Technique—A Valuable Tool in Corrosion Testing. H. L. Bilhartz and Howard E. Greenwell. *Corrosion,* v. 9, Feb. 1953, p. 66-72; disc., p. 72-73.

One company's method of using coupons. "Coupon technique" is only method of study which measures effect of both physical and chemical variables of corrosion environment. (R11)

76-R. Corrosion in Industry. Bruce Levelton. *Engineering Journal,* v. 36, Jan. 1953, p. 8-13.

Causes and prevention; examples of effect of corrosion on typical lumbering and paper mill equipment. Exposure tests, and theories for causes of failure, from which preventive measures are prescribed. Special attention is given to corrosion from oxygen and salt water. Photographs. (R general, ST)

77-R. (English.) Corrosion and Metal Attack in the Steam Water Cycle of the Steam Power Plant. Frederick G. Straub. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 14, 4 pages.

Causes of solubility of metal in feed water and effects of metal oxides on steel. Results of investigations which were made to define influence of feed water pH on metal solubility. (R4)

78-R. (French.) Influence of Oxide Layer Scaling on the Results of Accelerated Life Tests of Electrically Heated Wires. W. Betteridge. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 18, 4 pages.

Three different samples of 80% Ni, 20% Cr wires were tested by a modified procedure in which the wire alternated at intervals of 2 min. between two temperatures, upper one of which remained constant for a series of tests, but lower one was varied from approximately normal temperature (normal test) to upper temperature (continuous heating). (R2, Ni, Cr)

79-R. (French.) Corrosion of H. P. Boiler Tubes. M. Reignier. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 32, 7 pages.

Corrosion caused by CO_2, O_2, Fe in suspension and fissures. Tables and charts. (R4, CN)

80-R. (English.) High-Temperature Corrosion in Power Station Boiler Furnaces and Superheaters. J. H. Jackson. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 144, 24 pages.

Research conducted by Battelle Memorial Institute. One project involved performance of a group of wrought heat resistant alloys when exposed to furnace atmospheres of a number of different power station units. Another involved determination of means for protecting a Hg boiler from severe tube corrosion resulting when a high-sulfur fuel oil was burned. A third investigation was concerned with resistance of cast heat resistant alloys to corrosion by oxidizing and reducing flue gases at temperatures to 1090° C. (R7, R9, SG-h)

81-R. Scale Formation on Steel. W. Trinks. *Industrial Heating,* v. 20, Jan. 1953, p. 52, 54.

Formation of scale in combustion or natural atmospheres. (R2, ST)

82-R. Basic Factors in Electrolytic Corrosion. E. F. Wolf. *Iron and Steel Engineer,* v. 30, Jan. 1953, p. 102-105; disc., p. 105-106.

Review of fundamental principles includes factors influencing speed of corrosion, prevention of corrosion, and cathodic protection. Diagrams. (R1, R10)

83-R. Aerobic and Anaerobic Iron Corrosion in Water Mains. C. A. H. von Wolzogen Kühr and L. S. van der Vlugt. *Journal American Water Works Association,* v. 45, Jan. 1953, p. 33-46.

Study of principles involved and need to neutralize anodal and cathodal regions by application of internal protection. Photographs and diagrams. 28 ref. (R4, Fe)

84-R. Observation on Scaling of Iron. W. J. Wrazej. *Journal of Metals,* v. 5, sec. 2, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 265-266.

Preparation of samples and examination. Micrographs. (R2, Fe)

85-R. How Inhibitors Prevent Corrosion in Oil Wells. I. Thomas M. Newell. *Oil and Gas Journal,* v. 51, Feb. 9, 1953, p. 145.

Corrosion, and use of inhibitors in steel pipes. (R10, ST)

86-R. Don't Let Corrosion Eat Up Your Profits. Dan H. Carpenter. *World Oil,* v. 136, Feb. 1, 1953, p. 172-174.

Control measures for prevention of tube and pipe corrosion in oil and gas industry. (R10)

87-R. Pipe Line Corrosion and Cathodic Protection; Part 1. Soil Resistivity Surveys. Marshall E. Parker. *World Oil,* v. 136, Feb. 1, 1953, p. 210-212.

Circuit diagrams. (R10)

88-R. (German.) Quantitative Electro-Osmotic Investigation of the Structure of Colored Films. J. K. Wirth and W. Machu. *Werkstoffe und Korrosion,* v. 3, Dec. 1952, p. 453-460.

Zeta-potential, total cross sectional area, number of pores, capillary radii, distance between pores, and magnitude of water displacement were quantitatively determined. The increase in potential was found to control the corrosion process in coated metals. 12 ref. (R11)

89-R. (German.) Corrosion in the Sugar Industry. Ulrich Stark. *Werkstoffe und Korrosion,* v. 3, Dec. 1952, p. 441-444.

Corrosive action of acidic decomposition products which occur in normally alkaline cane juice. Service observations are compared with laboratory tests using acetic acid and steel samples. (R5, CN)

90-R. Corrosion Factors in Chemical Engineering. F. Howard. *Australasian Engineer,* Dec. 8, 1953, p. 67-71.

Mechanisms of corrosion; corrosion testing; welding and corrosion; choice of materials to resist corrosion; methods of corrosion control; and a factory program against corrosion. (R general)

91-R. Cavitation. E. Crewdson. *Engineer,* v. 195, Jan. 23, 1953, p. 122-123.

Suggests that damage done by cavitation is not consequence of collapse of bubbles, but high pressure and high temperature of gas within bubble can account for observed damage under cavitating conditions. (R2)

92-R. Why Oil Tanks Fail. Henry D. Crane. *Fueloil & Oil Heat,* v. 12, Feb. 1953, p. 68-70, 82.

Corrosion is caused by H_2O in the tanks and not by oil. Preventive measures. Photographs. (R7, ST)

93-R. Behavior of Refractory Oxides in Contact With Metals at High Temperatures. George Economos. *Industrial and Engineering Chemistry,* v. 45, Feb. 1953, p. 458-459.

Apparatus, procedures, and experimental results. Tables. 14 ref. (R2, Be, Zr, Ti, Cb, Mo, Ni, Si)

94-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 45, Feb. 1953, p. 93 A-95 A.

Summarizes corrosion of Al by HNO_3 as a function of temperature. Graphs. (R5, Al)

95-R. Corrosion. Some Problems in the Petroleum Industry. *Petroleum Times,* v. 57, Jan. 23, 1953, p. 63-71, 73-78.

Comprised of "The Use of Paints as Protectives in the Fight Against Corrosion: A Survey of Their Effectiveness", A. D. C. Hamilton; "Cathodic Protection Against Corrosion", G. G. Portch; "Corrosion Problems in Oil Tankers"; and, "Corrosion Control in Oil Refineries." (R7, R10, L26, Al, Ti, AY)

96-R. The Influence of Corrosion on the Cracking of Pressure Vessels. H. R. Copson. *Welding Journal,* v. 32, Feb. 1953, p. 75s-91s.

Forms of corrosion, corrosion from a design viewpoint, stress-corrosion cracking of Fe, stainless steel, Cu alloys, Al alloys, Mg alloys, and molten metals. Corrosion fatigue, local attack, intergranular attack, effect of stress on general corrosion, effects of H_2 generated by corrosion, and fields for future research. Photographs, micrographs, and tables. 101 ref. (R1, R2)

S

INSPECTION AND CONTROL

52-S. Gaugemeter for Strip Mills. R. B. Sims. *Engineering,* v. 175, Jan. 9, 1953, p. 33-35.

Accurate and relatively inexpensive gage meter eliminates previous problems encountered in measuring thickness of rolled strip. Theory and industrial use. Disadvantages. Diagrams and graphs. (S14)

53-S. Ultrasonic Testing Used for Small-Diameter Tubing. Andrew J. Pardus. *Iron Age,* v. 171, Jan. 29, 1953, p. 110-113.

Procedures and equipment were developed by which ultrasonics can be applied successfully to locate flaws in small-diameter steel tubing. High-frequency pulsating sound waves sent into tubing locate flaws by reflecting from defect. Best results are obtained with a 1-megacycle, 1-in. quartz crystal, angle searching unit. Photographs. (S13, ST)

54-S. Gamma Ray Radiography. *Machinery Lloyd* (Overseas Ed.), v. 25, Jan. 3, 1953, p. 79, 81, 83.

Methods and applications of γ-ray equipment for nondestructive testing in plants rather than in laboratories. (S13)

55-S. The Testing of Anodic Coatings. *Metal Industry,* v. 82, Jan. 2, 1952, p. 11-13.

Method for determining thickness by breakdown voltage. (S14, L19, Al)

56-S. How You Can Specify Surface Finishes. *Steel,* v. 132, Jan. 19, 1953, p. 74-78.

Standard terminology used by Yale & Towne Mfg. Co., for clearer understanding of surface finish specifications. Photographs and diagrams. (S15)

57-S. (English.) Temperature Measurement During Heat Treatment of Aluminum. A. v. Zeerleder. *Aluminium Suisse,* v. 2, Nov. 1952, p. 200-202.

Construction, application, and advantages of thermo-electric measuring devices. (S16, J general, Al)

58-S. (German.) Electromagnetic Alternating-Field Processes for Nondestructive Testing of Iron Materials. *Archiv fur das Eisenhuttenwesen,* v. 23, Nov.-Dec. 1952, p. 443-448.

By determining apparent change of resistance of a coil through which an alternating current flows and which magnetizes the parts to be tested, it is possible to separate these parts according to their composition, heat treatment, and hardness. Welding electrodes can be separated according to weldability. (S10)

59-S. (French.) Utilization of X-Rays and Gamma Rays in the Inspection of Generator Parts. P. Ruault. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 34, 19 pages.

Absorption of X-rays and γ-rays; different sources of radiation; diffused radiations; factors in the detection of defects; radiographic emulsion; and protection of working personnel. Photographs and tables. (S13)

60-S. Thermal Conductivity Method for Analysis of Hydrogen in Steel. Bruce M. Shields, John Chipman, and Nicholas J. Grant. *Journal of Metals,* v. 5, sec. 1, Feb. 1953; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 197, 1953, p. 180-184.

Vacuum Sn-fusion method of analysis for H_2 was modified to permit analysis of evolved gases for H_2 by means of a thermal conductivity cell. Tables. 15 ref. (S11, ST)

61-S. A Special Thermocouple for Measuring Transient Temperatures. David Bendersky. *Mechanical Engineering,* v. 75, Feb. 1953, p. 117-121.

Special thermocouple having a junction thickness of 1 micron, which is of such rugged construction that it may be employed to measure extremely rapid temperature changes in regions of high stress. Employs Ni and steel contacts. Diagrams, graphs, and micrographs. (S16, ST, Ni)

62-S. Heating Tube Failures. Cause and Prevention. John J. B. Rutherford. *Petroleum Processing,* v. 8, Jan. 1953, p. 62-69.

Material properties; furnace design; selection of materials, including carbon steel and Mo-Ni steel; service and inspection; and failures from mechanical and chemical causes. Micrographs and graphs. 11 ref. (S21, Q general, CN, AY)

63-S. Testing Brightens Profit Picture. W. E. Thomas. *Steel,* v. 132, Feb. 2, 1953, p. 104-108, 110.

Advantages of nondestructive testing and where in the processes it is advisable to use it. Photographs, tables, and diagrams. (S13)

64-S. Close Checks Produce Top Tool Steels. Leonard C. Grimshaw. *Steel,* v. 132, Feb. 9, 1953, p. 102, 104, 107.

Control measures in all phases of toolsteel production including spectrographic analysis, temperature controls, ultrasonic testing of billets and forgings, and magnetic testing. (S11, S13, S16, TS)

65-S. Radiochemistry and Germanium. George H. Morrison. *Sylvania Technologist,* v. 6, Jan. 1953, p. 17-20.

Use of radioactivity in research. Experiments in Ge purification. Photographs. (S19, Ge)

66-S. Radiography in a Clyde Shipyard. E. J. Duffy. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 96, 1952-53, p. 34-64.

Recent developments in field of radiographic inspection based on availability of artificially created radioactive isotopes. Comparison between results obtained using X-rays and gamma rays, with particular reference to plate thickness of ½ to 1½ in. (S13, S19, CN)

67-S. (French and German.) Nondestructive Materials Testing With Synthetic Radioactive Isotopes. Hans Stäger. *Zeitschrift für Schweisstechnik; Journal de la Soudure,* v. 42, Oct. 1952, p. 193-201; Nov. 1952, p. 219-229; Dec. 1952, p. 238-244.

Production and selection of radioactive isotopes; destructive and nondestructive testing; flow chart on testing, tabulated survey of nondestructive testing methods, table of synthetic radioactive isotopes, and diagrams; use of Ir^{193}, Ta^{182}, and Co^{60} for nondestructive testing; practical application to testing welds; testing of large diameter tubes, welded vessels, wheels, and centrifuge baskets. (S13, S19)

68-S. Ultrasonic Inspection of Thin Metallic Sheet or Plate. R. Wilson. *Sheet Metal Industries,* v. 30, Feb. 1953, p. 146-160.

Recently developed method particularly applicable to sheet or material of relatively thin cross section. Graphs, diagrams, and micrographs. 10 ref. (S13)

69-S. (Book—German and French.) (Nondestructive Testing.) Zerstörungsfreie Werkstoffprüfung. Institut für Metallforschung. 166 pages. 1952. Verlag Stahleisen, Dusseldorf, Germany.

A symposium consisting of 9 papers in German and 11 papers in French. X-ray, γ-ray, ultrasonic, magnetic, and electrical test methods are discussed. (S13)

T

APPLICATIONS OF METALS IN EQUIPMENT

43-T. Requirements for Large, Light-Metal Forgings and Extrusions in the Aircraft Industry. George W. Papen. *Aeronautical Engineering Review,* v. 12, Jan. 1953, p. 24-33.

General discussion supported by an analysis of trends in performance on aircraft structure, function, and production. Detail requirements of large forgings and extrusions relative to physical properties, tolerances, and refinements. Tables and diagrams. (T24, Al, Mg)

44-T. High Temperature Service. R. M. Braca and R. Merims. *Chemical Engineering,* v. 60, Feb. 1953, p. 165-169, 328, 330-332, 334-336.

Comprehensive survey to aid in selecting materials and designing equipment for high-temperature service in petroleum and chemical plants. Includes influence of alloying elements and mechanical properties of metals used. (T29, Q general)

45-T. Tests Establish Aluminum Connection Principles. C. P. Xenis. *Electric Light and Power,* v. 31, Jan. 1953, p. 128-130, 132.

Effects of indentation depth and resistance of bus joint connections. (T1, P15, Al)

46-T. LTF's New Copper Aluminum Bi-Metal Plate. James K. Martin. *Graphic Arts Monthly,* v. 25, Jan. 1953, p. 110, 112, 116, 118, 120, 123-124, 178, 180.

General discussion emphasizing recent applications. (T9, Cu, Al)

47-T. Selection of Engineering Materials; Ferrous Alloys. S. C. Churchill. *Machinery* (London), v. 82, Jan. 16, 1952, p. 109-114.

Reviews new processes successfully tested, and conventional designs produced in materials not normally associated with them. (T general, ST, CI)

48-T. Annual Engineering Materials Review and Forecast. T. C. Du Mond. *Materials & Methods,* v. 37, Jan. 1953, p. 101-116.

A quick look at developments in engineering materials reveals some changes in use of materials that will be forthcoming and influences that will bring these changes about. Discusses irons and steels; nonferrous metals including high-temperature alloys, carbides, Cu alloys, Al alloys, Mg, Ti, and minor metals; nonmetallic materials; parts and forms; finishes and coatings; and processing methods including heat treating and joining. Photographs. (T general, J general, K general)

49-T. Steel Wires for Pre-Stressed Concrete. Hermann Wedl. *Draht* (Wire) (English Ed.), Dec. 1952, p. 33-36.

Properties of steels, especially steel wires, which are used as prestressing members in ferro-concrete constructions. Comparison of steel qualities required for slack reinforcements and prestressed constructions. Manufacture of prestressed concrete wires and their most important properties. Standard specifications. Graphs. 11 ref. (T26, ST)

50-T. (English.) The Aluminium Collapsible Tube, Its Development and Use. G. H. Ott. *Aluminium Suisse,* v. 2, Nov. 1952, p. 185-197.

Development and typical applications. Photographs show details of the manufacturing processes. (T10, G general, Al)

51-T. Evaluation of Core Materials for Magnetic Amplifiers. I. D. C. Dieterly. *Electrical Manufacturing,* v. 51, Jan. 1953, p. 68-73, 274, 276; Feb. 1953, p. 124-127, 380.

Analysis is based on oscillographs of flux-current loop. Test circuit for establishing control magnetization curve for any core material. (T8, SG-n, p)

52-T. Aluminium Hangar for "Comet" Aircraft. *Engineering,* v. 175, Jan. 23, 1953, p. 97-99.

Extensive use of Al and fabrication of British hangar. (T26, Al)

53-T. Aluminum Conductors in Busway Systems. Joe St. Andre. *Factory Management and Maintenance,* v. 3, Feb. 1953, p. 110-112.

Use of Al in place of Cu. Includes six requirements for Al busway, seven factors for trouble-free operation, and corrosion tests of joint connections used by Underwriters' Laboratories. (T1, Al)

54-T. (French.) Gas-Heated Infrared Radiation Driers. Marc Fischer. *Fourth International Congress on Industrial Heating* (Paris), 1952, No. 90, 12 pages.

Two recent developments in field of infrared radiation drying: application of radiant panels made of ribbed cast iron, and driers with radiant tubes having ventilated burners. Schematic drawings. (T5, CI)

55-T. You'll Be Getting Better Electrical Sheet and Strip. N. P. Goss. *Iron Age,* v. 171, Feb. 5, 1953, p. 147-152, 186-188.

Use, production, and advantages of highly oriented polycrystalline Si steel in electrical industry. Photographs. (T1, AY)

56-T. Titanium Is Vital to the Air Force. John N. Dick. *Journal of Metals*, v. 5, sec. 1, Feb. 1953, p. 133-135.

Cooperation between industry and government for developing and utilizing Ti. (T24, Ti)

57-T. Navy Has Large Titanium Program. Edward L. Beardman. *Journal of Metals*, v. 5, sec. 1, Feb. 1953, p. 138-139.

Naval interest and part played in developing Ti. Present and possible future applications and research program. (T22, T24, Ag, Ti)

58-T. Application of Titanium Sheet-Strip Limited by Presently Available Alloys. J. W. Sweet. *Journal of Metals*, v. 5, sec. 1, Feb. 1953, p. 143-145.

Present status of Ti sheet and strip. Experiences of fabricators attempting to use it. Aircraft applications. Photographs. (T24, F22, G general, Ti)

59-T. Wrought Magnesium for Automobiles. *Light Metals*, v. 16, Jan. 1953, p. 11-12.

General discussion. (T21, Mg)

60-T. Progress in the Aluminum Industry. Junius D. Edwards. *Metal Progress*, v. 63, Jan. 1953, p. 94-98.

Recent uses for Al and its alloys in aircraft, marine and architectural industries. (T22, T24, T26, Al)

61-T. Notable Advances in Fabrication Methods and Metal Applications. Tom Bishop. *Metal Progress*, v. 63, Jan. 1953, p. 115-120.

Recent uses of alloy steels in jet turbine design, including disk and blade manufacture. Surface diffusion processes. Fabrication of tool and die steels. (T5, T25, L15, F22, AY, TS)

62-T. Ductile Iron, a New Design Material Steps Into Your Plant. *Power*, v. 97, Feb. 1953, p. 122-123.

Properties and uses in diesel engines, pump parts, and in power plants. Photographs. (T25, CI)

63-T. Aluminium Alloy Coaches. T. W. Barrow. *Railway Gazette*, v. 98, Jan. 16, 1953, p. 68-70.

Emphasizes design of new lightweight sleeping cars for East African Railways. (T23, Al)

64-T. Machine Tool Materials. W. D. Biggs. *Welder*, v. 21, Oct.-Dec. 1952, p. 91-94.

Materials used for machine tools. A short classification and properties which should be obtained. (T5, G17, TS)

65-T. Steel Won't Be Magnetic on This Non-Magnetic Ship. L. G. Stevens. *Welding Engineer*, v. 38, Feb. 1953, p. 23-25.

Use of Cr-Ni stainless steel for construction of a minesweeper. 200-amp. arc welders and oxyacetylene outfits are used. (T22, K1, K2, SS)

66-T. Structural Steel Assembly Line. Howard E. Jackson. *Welding Engineer*, v. 38, Feb. 1953, p. 43-46.

Fabrication of steel cradles and pots for use in Al reduction plant. Photographs. (T5, C23, CN, Al)

67-T. Cast Alloys for Salt-Bath Heat Treating. J. H. Jackson. *Alloy Casting Bulletin*, Nov. 1952, p. 1-5, 7-10.

Results of research project conducted at Battelle Memorial Institute for purpose of learning to what extent various high alloys corrode in salt baths. Experimental samples represented alloys of the Fe-Ni-Cr systems, with a specimen of mild steel included for comparison. (T5, R6, J2, AY, CN)

68-T. Selection of Materials for Use in Chemical Engineering. J. P. Baxter. *Australasian Engineer*, Dec. 8, 1952, p. 62-65.

The wide range of materials now available to design engineer, and some of the problems which may arise in their use. Includes steel, stainless steel, Ni, Al, Cu, Ag, Mo, W, Ti, and Zr. (T29)

69-T. New Stainless Steel Widens Design Possibilities. Gilbert C. Close. *Finish*, v. 10, Feb. 1953, p. 19-20, 82.

Advantages of 17-7PH precipitation hardening stainless steel alloy. (T general, SS)

70-T. Plastics: Machinery Market Booms. H. R. Simonds. *Iron Age*, v. 171, Feb. 12, 1953, p. 143-146.

Various types of equipment used in making prime materials for plastics industry. Much of this equipment is made of stainless, nickel-clad, and special steels. (T29, Ni, CN, CI, SS)

71-T. Aluminum Honeycomb Sandwich Structures. *Product Engineering*, v. 24, Feb. 1953, p. 184-191.

Construction; process control; effect of density on crushing and shear strength; and typical design and joint details. Photographs, diagrams, and tables. (T26, K12, Al)

72-T. New Bolting Material Good for the Tough Spots. J. F. Klement. *Steel*, v. 132, Feb. 16, 1953, p. 92.

Al bronze of iron-bearing single-phase type resists corrosion in salt water, alkalis, and acids. Graphs. (T7, R5, Al, Cu)

73-T. (Book.) **Steel Construction.** 70 pages. 1952. Anglo-American Council on Productivity, 21 Tothill St., London, S. W. 1, England; or 2 Park Ave., New York 16, N. Y.

Compares American and British methods. Technical detail covers structural steelwork in bridges and framed buildings, tanks, pressure vessels and pipes, and mechanical handling plant. (T26, ST)

V

MATERIALS
General Coverage of Specific Materials

21-V. The Economic Importance of the Rare Earths. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 25, Jan. 3, 1953, p. 91, 93-94.

Value of adding rare earths, Ce, La, Nd, Er, Yb, Pr, Pm, Sm, Eu, Tm, Lu, Gd, Tb, Dy, and Ho, to cast iron, alloy steels, stainless steel, tool steels, Si steels, and heat resisting steels. Superior mechanical properties, better resistance to corrosion, easier cogging and forging, and higher electrical properties. (R general, Q general, P15, F22, AY, EG-g)

22-V. Materials Data Sheet. Low Expansion Nickel Alloys. *Materials & Methods*, v. 37, Jan. 1953, p. 123.

Tabulated information on physical and mechanical properties, thermal treatment, fabricating properties, corrosion resistance, and available forms. (P general, Q general, J general, G general, R general, SG-s)

23-V. Perunal, A High-Strength Aluminum Alloy of the Al-Zn-Mg-Cu Type. H. Hug. *Aluminium Suisse*, v. 2, Nov. 1952, p. 203-209.

Reports on a Swiss alloy, containing 90% Al, 6% Zn, 2% Mg, 1.5% Cu, 0.3% Mn, and 0.2% Cr. Structure, heat treatment, properties, and applications are diagrammed and illustrated. (M27, J general, Q general, T general, Al)

24-V. (English.) **Types of Stainless Steel Produced in Sweden.** Gunnar Lindh and Helmer Nathorst. *Jernkotorets Annaler*, v. 136, No. 10, 1952, p. 413-428.

Properties and uses of Swedish stainless steels. Data are tabulated. (Q general, T general, SS)

25-V. (Norwegian.) **Boron in Special Steels.** *Teknisk Ukeblad*, v. 99, Nov. 6, 1952, p. 844-846.

Sources, properties, and uses of boron and the development, production, forging, heat treatment, and uses of boron steel. Graphs. (D general, F22, J general, T general, AY)

26-V. NAA Reveals Titanium Experience. *Aviation Week*, v. 58, Feb. 2, 1953, p. 21-22, 25, 27-28.

Work to date indicates that stretching processes are better for this metal than impact methods. Includes discussion of properties and welding of titanium. Photographs and diagram. (G general, Q general, K general, Ti)

27-V. Search for High-Temperature Materials. William L. Bruckart. *Battelle Technical Review*, v. 2, Feb. 1953, p. 19-20.

Use of ceramics, promise of Mo, Mo alloys and other metals, and problem of joining. (SG-h, Mo, AY)

28-V. Titanium Evaluated for Ordnance. Benjamin S. Mesick. *Journal of Metals*, v. 5, sec. 1, Feb. 1953, p. 136-137.

Occurrence, reduction, physical properties, mechanical properties, weldability, and fabrication of Ti. (T2, Ti)

29-V. Developments in Alloy Steels: A Review of Recent Progress. C. Sykes. *Metallurgia*, v. 47, Jan. 1953, p. 3-8.

Places main emphasis on field of corrosion and heat resisting steels. Reference to high speed steels, boron steels, and use of rare earths as alloying elements. Also Cb steels, corrosion resistance, and intergranular corrosion of stainless steels. Tables, diagrams, photographs. 30 ref. (R general, AY, SS, SG-h)

30-V. Copper and Copper Alloys: A Survey of Technical Progress During 1952. E. Voce. *Metallurgia*, v. 47, Jan. 1953, p. 9-17.

Production, foundry practice, fabrication, finishing and plating, properties and applications, corrosion and protection, joining, physical metallurgy, powder metallurgy, analysis, and testing. 205 ref. (Cu)

31-V. A Sterling Silver Containing Aluminium. G. E. Gardam. *Metallurgia*, v. 47, Jan. 1953, p. 29-33.

Addition of small amounts of Al to sterling silver to prevent "fire-stain" defects and enhance hardness. Constitution of the alloys, precipitation hardening, properties. Diagrams, microphotographs, and photographs. 6 ref. (Ag)

32-V. Developing Nimonic Alloys. *Aeroplane*, v. 84, Jan. 23, 1953, p. 122-124.

Methods of research, testing, and production of various alloys. Photographs. (Ni)

33-V. Gold. In Fact, Fiction, and Finance. Carle R. Hayward. *Technology Review*, v. 55, Feb. 1953, p. 207-210, 216, 218, 220.

Considers Au from original discovery to present times. (Au)

34-V. (Book.) **Refractory Hard Metals.** Paul Schwarzkopf and Richard Kieffer. 400 pages. 1952. Macmillan Co., 60 Fifth Ave., New York 11, N. Y. $7.50.

Covers the high-melting carbides, borides, nitrides, and silicides, which are expected to play a predominant part in future metallurgical developments. Methods of preparation and properties of these substances as well as their applications in high-temperature materials. Includes for comparison, recent high-temperature developments in superalloys and ceramics. (EG-d, SG-h)

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EMPLOYMENT SERVICE BUREAU

(continued from page 37)

POSITIONS WANTED

METALLURGICAL ENGINEER: B.S. degree, age 38. Fifteen years diversified industrial experience, principally in processing of ferrous metals. Expert on alloy steel heat treating, gear metallurgy, service failures, specifications, and related metallurgical fields. Experienced in ordnance and aircraft work. Interested in plant management and/or supervisory work. Would be willing to relocate. Box 3-85.

DEVELOPMENT ENGINEER: Sound technical background in ferrous metallurgy and arc welding. Seven years supervisory experience in laboratory of integrated electric furnace steel plant, 8 years in development of coated arc welding electrodes with outstanding company in field. Interested in sound opportunity. Location immaterial. Box 3-90.

METALLURGICAL ENGINNER: M.S.E. degree, age 29. Two years experience in development, trouble shooting, and specification work. Desires challenging position in development of ferrous, nonferrous, or high-temperature fields. Prefers Midwest location. Box 3-95.

METALLURGIST: B. S. degree in metallurgical engineering. Experienced in selection of wrought steels and ferrous coatings for industrial apparatus, preparation of specifications for materials and processing, analysis of causes of failures of machine parts, technical report writing. Familiar with current developments of ferrous alloys and manufacturing methods. Age 35, married. Box 3-100.

REPRESENTATIVE: Canada-Maritime Provinces and Newfoundland. Sales engineer with top-flight American speciality oil and metalworking products company will consider servicing and extending established noncompetitive line or special assignments. Excellent connections with all preferred accounts in area. Box 3-105.

TEACHING AND RESEARCH: Veteran, married, age 32. M.S. degree and advanced credit. Six years teaching, both beginning and intermediate courses in heat treating, physical metallurgy and foundry. Laboratory experience includes carburizing, martempering, metallography, quality control, electric furnace operation, molding, sand testing, etc. Present salary $6000 for ten months. Prefers Midwest. Box 3-110.

METALLURGIST-CHEMIST: Technical college education, 28 years practical experience. Age 53. Familiar with analyses of steel, alloys, nonferrous metals, heat treating, plating, brazing, welding, metallurgical and mechanical inspection and developing on aircraft parts. Seeking position as metallurgist or developing consultant. Box 3-115.

Mechanical Engineer

For process development and equipment design for experimental fabrication procedures. Location in Northern Ohio. Box 3-15, Metals Review.

WELDING RESEARCH SUPERVISOR

Industrial research organization covering broad field of welding and the physical metallurgy of welding. Activity must cover theoretical work, electrical aspects, and application of welding and brazing processes. Promising opportunity with excellent metallurgical supporting department. Box 3-165.

METALLURGICAL ENGINEER

Recent graduate, 1 to 3 years experience, for applied research and development work in a variety of precious metal alloys, bimetals, powders, and in silver alloy brazing. Good background in physical metallurgy and physical chemistry desirable. Excellent opportunity in long established, successful and expanding small company. Prefer candidates with good scholastic records. Write: Metallurgical Dept., Handy and Harman, Bridgeport 1, Conn.

METALLURGIST

For research and development on fabrication processes for unusual metals and alloys. Location in Northern Ohio. Box 3-150, Metals Review.

DEVELOPMENT ENGINEER

For design & development engineering in connection with a patented process for the molecular bonding of dissimilar metals, and which has wide commercial application.

Excellent opportunity for a graduate engineer with a metallic product design & development background. Some metallurgical training or experience preferred, but not essential.

Personal Interviews

Mon. thru Fri., 9 AM to 3 PM

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1. Write to the original source of the article asking for tear sheets, a reprint or a copy of the issue in which it appeared. A list of addresses of the periodicals annotated is available on request.

2. Order photostatic copies from the New York Public Library, New York City, from the Carnegie Library of Pittsburgh, 4400 Forbes St., Pittsburgh 13, Pa., or from the Engineering Societies Library, 29 West 39th St., New York 18, N. Y. A nominal charge is made, varying with the length of the article and page size of the periodical.

Write to Metals Review for free copy of the address list

METALS REVIEW

7301 Euclid Avenue **Cleveland 3, Ohio**

NONFERROUS PHYSICAL METALLURGIST: Age 49, German. Two doctorates. Twenty-five years of successful fundamental and applied research in copper, aluminum, zinc. Thirty publications, 10 articles not yet published. Patents. Knows German, French, English, Hungarian. Preferential immigration visa, if hired as a specialist and employer's application is approved by nearest District Office of the Immigration and Naturalization Service. Box 3-120.

METALLURGIST: M.S. degree, 39 years old, 14 years experience. Desires position in West or on West Coast. Will consider teaching. Box 3-125.

METALLURGIST: With 14 years progressive experience in research, manufacturing and engineering, and presently in responsible engineering position, seeking still greater responsibility in the management or organization of either metallurgical or quality control department. Box 3-130.

TECHNICAL DIRECTOR - METALLURGICAL EXECUTIVE: Graduate metallurgist with 17 years experience. Outstanding reputation in stainless steel and high-temperature alloys. Well known in field of sand, permanent mold, die, plaster and investment casting of light metals and other nonferrous alloys. Capable writer and speaker. Practical as well as administrative experience. Box 3-135.

METALLURGICAL ENGINEER: E.Met. degree, age 30, married. Being released from Army this month. Would like position dealing with steel. Has experience with hubs and dies. Prefers Northeast. Box 3-140.

PHYSICAL METALLURGIST: M.S. in physical metallurgy, age 34. Ten years diversified experience in research and development. Some teaching. Desires teaching appointment at colleg level with opportunity to do research. Resume on request. Box 3-145.

PHYSICAL METALLURGIST: M.S. degree in metallurgical engineering, age 33. Diversified background in modern alloy steel foundry including process work, plant research, production supervision, and plant metallurgist. Box 3-185.

METALLURGICAL ENGINEER: B.S. degree, age 36, married. Ten years diversified experience in ferrous and nonferrous physical metallurgy; seven years aircraft; three years industrial machinery. Experienced in metallurgical laboratory procedures, development, failure analysis, production process control, specification writing, heat treatment of ferrous and nonferrous materials. Desires position in development or production. Box 3-190.

DEVELOPMENT ENGINEER: B.S.Ch.E. degree, 1944. M.S. in metallurgy, 1951. Experience includes 6½ years on development problems associated with chemical processes. Desires challenging position in development or research as group leader. Box 3-195.

METALLURGIST: Five years laboratory experience covering ferrous and nonferrous problems in aircraft. Experience includes heat treatment, physical metallurgy, process control and metallography. College graduate with executive training. Majority of experience in metallurgical problems dealing in aluminum forgings, extrusions, and proce·s control of heat treating facilities. Box 3-200.

TRANSACTIONS AMERICAN SOCIETY FOR METALS wanted to buy for cash back years, also other scientific and technical periodicals. ASHLEY, 24 East 21, New York 10, N. Y.

TECHNICAL ASSISTANT to Research Director. Must be graduate metallurgist with ability to write clear, concise reports interpreting research results. Background in ferrous metallurgy, welding, corrosion desirable. Chicago region, salary open. Reply in confidence to Box 3-5, Metals Review.

FOR SALE

Two Salem Gas Annealing Furnaces, Model 501. 1 H.P. induction motor drives metal conveyor 21 in. wide with electric control panels. Each unit occupies a space 7½ ft. wide x 26 ft. long. Capacity, 3,475,000 BTU or 3000 cu. ft. per hr. Each unit is connected to conveyor 13½ in. wide x 10 ft. long. Excellent condition. Priced to sell. Contact: W. Furlong, Gibson Manufacturing Corp., Longmont, Colo.

ANALYTICAL CHEMIST

Good chemist with experience in copper base alloys required. Ability to work well with other laboratory staff personnel. College education desirable but not essential. Company established 35 years and a leader in brass and copper industry. Salary open.

Write to: Personnel Department

Mueller Brass Co.,
Port Huron, Mich.

PRODUCT DEVELOPMENT ENGINEER

Graduate Engineer with creative ability to develop improvements in present products and develop new products in the refrigeration, plumbing and heating field. Technical Degree—Master's or Doctor's. Company established 35 years and a leader in the copper and brass industry. Salary commensurate with job requirements and applicant's qualifications.

Write to: Personnel Department
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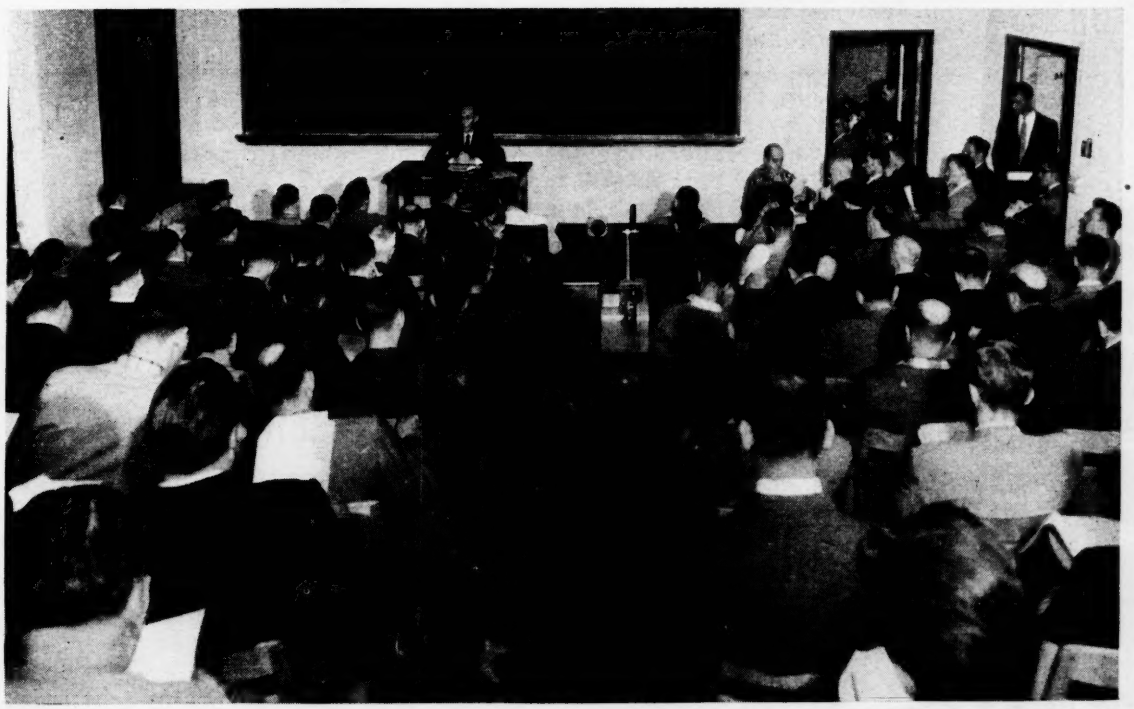
Inland Empire Course Draws Overflow Crowd



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ADDITIVES—VERSUS—RECTIFIERS

The benefits of the new combinations of salt baths containing additives can be summarized briefly as follows:

1. **The additives do not create sludges, but rather act to neutralize alkalies.**

2. **Further, the additives react with metal oxides which cause decarburization and sludge to decompose these oxides either partially to gases, or to complete reaction which is approximately the same specific weight as the salt compound. This therefore eliminates sludges, except for contamination from fixtures.**

3. **Additives in the high temperature baths, when used for hardening high speed steels, whether with inconel or chrome electrodes, keep the electrodes clean, preventing attack at the grain boundaries and further convert the chrome oxides to pure metallic chrome.**

4. **The use of these additives, therefore, plays an important part in maintaining the fluidity of your salt bath and lengthening the life of the electrodes. Also, these salt baths which have additives in them, when used in alloy pots, react with alkalies and metal oxides, nullify the effects at the grain boundaries of the alloy pots.**

5. **These products—Hardening 185-10, Hardening 127-11, Hardening 127-12, Hard Brite AA-10, High Speed Preheat 13-17-10 and High Speed 17-24 AA-10—will increase electrode life, ceramic and alloy pot life.**

6. **Holden Salt Baths can be used in any type of competitive furnace. We will assume manufacturer's guarantee with any proven design.**

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